

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Daily Newspaper

Second-class postage paid at Framingham, Mass. and additional mailing offices ©1983 by CW Communications/Inc.

1/1 year

August 22, 1983

Vol. XVII, No. 34

May larges ssing Los Alamos CPU

By Jeffrey Beeler

CW West Coast Bureau

MILWAUKEE — About a dozen area youths who apparently made a hobby of circumventing data security safeguards face possible prosecution for allegedly penetrating a system in a U.S. nuclear weapons research center.

In addition to violating systems security at the Los Alamos (N.M.) National Laboratory, the youths reportedly gained unauthorized access to files in several other organizations, Federal Bureau of Investigation Special Agent Dan Craft said last week. Two of those compromised reportedly include the Milwaukee School of Engineering and the Security Pacific National Bank in Los Angeles.

In the Los Alamos case, the alleged security breach involved only unclassified documents, such as general correspondence and nonsensitive scientific reports. None of the facility's classified research data or other confidential records was compromised during the break-in, nor were any of the unclassified files erased or altered, according to the laboratory's public affairs officer, James Breen.

Damage was also said to be inconsequential at Security Pacific, where an attempted systems invasion apparently took place during the week-end of Aug. 13-14. The target of the suspected attack was a general-purpose (Continued on Page 8)

Niosh to Persist In VDT Study

By Katherine Hafner

CW Staff

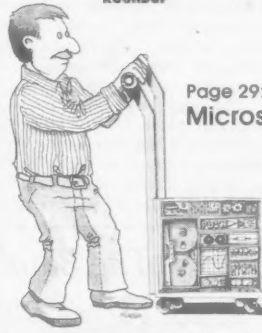
CINCINNATI — As long as video display terminal operators continue to have health-related complaints, the National Institute of Occupational Safety and Health said it will continue to conduct research into the effects of terminal use on public health.

"We're a public health agency," commented Barry Johnson, director of Niosh's Biomedical and Behavior Science Division. "And as long as we're receiving indications from the work place that there are health-related problems associated with VDT use, we have an obligation to continue our research."

Johnson's comments came last week in the midst of what he described as "a controversy created by the media" over a recent study pre-

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COMPUTERWORLD'S ANNUAL HARDWARE ROUNDUP



Page 29:
Micros

Inside

Would you spend \$10,000 to rent a hole in the ground? Some New York City communications users are. Page 4.

Control Data Corp. last week launched a new company to develop the next generation of supercomputers and set a 1986 target date for the delivery of a 10-billion floating point operations per second (Flops) scientific processor. Page 7.

Get our Medicaid Management Information System up and running by Oct. 1 or lose the job, Massachusetts officials have told Systems Development Corp. Page 12.

At last week's Frontiers of Supercomputing Conference in Los Alamos, N.M., business and science leaders alike called on the federal government to help them stop Japan from becoming the world technology leader. Page 14.

Digital Equipment Corp. beefed up its Professional 350 microcomputer with a number of hardware and software enhancements, reportedly boosting the system's speed and throughput by 25%. Page 53.

A hospital in York, Pa., has converted from shared-service processing to an in-house system boasting a local-area network. Page 63.

The recession has taken its toll on the salaries of computer and electronics professionals. The American Electronics Association found pay increases are down nearly 2%, although perquisites have risen 19%. Page 67.

Two Top State Courts Rule Software Tapes Subject to Sales Tax

By Bill Laberis

CW Staff

High courts in two states this month have decided that software tapes are tangible personal property and are therefore subject to state sales taxes.

The rulings in Maryland and Vermont — believed to be the first of their kind — were a setback both for industry groups, which have argued that the sale of software tapes represents the transfer of intangible (nontaxable) knowledge, and to users, who ultimately pay the tax.

The rulings further highlight the complexity of the sales tax issue and the difficulty courts are encountering in applying existing laws to state-of-the-art technology.

The Vermont Supreme Court last week overturned a lower court decision by ruling that a \$15,700 financial package purchased by the Chittenden Trust Co. is a taxable item. In rendering its decision, the court lumped the mainframe package into a category with books, cassettes, films "and other taxable personal property." The bank had initially appealed the state Tax Department's ruling requiring the tax be paid and won its appeal in Vermont Superior Court.

But in rendering the final say in the case, the Supreme Court declared that if the program had been delivered over telephone wires or other-

Need for Funds Seen Real Issue

Industry sources last week conceded they are fighting an increasingly steep uphill battle against software taxation. The real issue is not at all whether software is a tangible or intangible good, they believe, but the states' fiscal requirements, which have grown more pressing with recent cuts in federal aid.

"The states are in need of revenue, and they know where the growth areas of the economy are," said Ron Palenski, assistant general counsel for the Association of Data Processing Service Organizations, Inc. "Let's face it, they see computers and software as a good place to raise some money."

Palenski said that Adapso's official position is that software ought (Continued on Page 4)

wise electronically, the sales tax would not have applied because there would have been no transfer of tangible property, in this case computer tapes. The court also declared that had the bank hired a contract programmer to write the same soft-

(Continued on Page 4)

Study Finds IBM Sites Toss 10 Months' Software Yearly

By Paul Gillin

CW Staff

STAMFORD, Conn. — The average IBM mainframe site throws away the equivalent of 10 months' worth of applications software each year, according to a survey released here recently by Techtran Industries, Inc.

Meanwhile, the applications backlog at the average site is increasing at the rate of about three months per year.

The survey of 33 IBM mainframe sites conducted for Techtran by Xephon Technology Ltd. also found that the average user would have to wait 3½ years for development work to begin on an application requested today.

"A significant number of sites are running hard and getting nowhere ... with escalating demands for new applications and a heavy mortality

rate among existing applications," the survey stated. However, not all managers surveyed felt that a healthy applications backlog was a bad thing. A certain queue of jobs waiting to be processed is necessary to maximize activity, they noted, and the backlog may prevent some users from requesting unnecessary applications.

Asked to rank seven methods of reducing backlog in terms of their relative importance, the managers cited on-line programming as offering the greatest potential. This was followed by devotion of more resources to development; use of applications generators; increasing development staff; offering resources for end-user computing; and buying more packaged applications.

Structured methods are the least (Continued on Page 6)



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Please address all correspondence to the appropriate department at Box 680, 375 Cochituate Road, Framingham, Mass. 01701. Phone: (617) 879-0700. Telex: 95-1133.

OTHER EDITORIAL OFFICES & SALES OFFICES:
 New York: Suite 7C, 401 East 80th St., New York, N.Y. 10021. Phone: (212) 570-2135.
 West Coast: 257 Lytton Ave., Palo Alto, Calif. 94301. Phone: (415) 328-8064.

Washington, D.C.: 880 National Press Building, 529 14th St. N.W., Washington, D.C. 20045. Phone: (202) 347-6718.

England: Terry Cartwright, IEC Publications, 196-200 Bala Pond Rd., London N1 6AG. Phone: 01-309-3525. Telex: (051) 894085 (Computer Management, Computer Business Europe only).

East Bonn: Bill Dunlop, Stephen Thomas, Beers Hudson Assoc., 345 Cornwell Rd., Islington, London EC1V 9HN. Phone: 01278 3415/6 (telex for all CWCI publications except Computer Management and Computer Business Europe).

W. Germany: Eckhard Updehl, CW Publikationen, Friedr. Strauss 31, 8000 Munich 40. Phone: (089) 34-90-61. Telex: 521336.

France: Axel Leblond, Le Monde Informatique, 42, Avenue Montaigne, 75008 Paris. Phone: 720 85 66.

Japan: Mr. Shiohei Kania, Computerworld Japan, 7-4 Shintomi 1-Chome, Chuo-ku, Tokyo 104. Phone: (03) 551-3882. Telex: 252-4217 (Computerworld Japan only).

Enkhuin 4, Yamada Tokyo Representative Group, Yamaguchi Bldg., 2-12-9 Kanda Jimbicho, Chiyoda-ku, Tokyo 101. Phone: (03) 226-417/8. Telex: 128660 (telex for all CWCI publications except Computerworld Japan).

Australia: Alan Power, Computerworld Pty. Ltd., 37-43 Alexander Street, Crows Nest, NSW 2065. Phone: (02) 478133. Telex: A476732.

Brazil: Eric Hippieu, Data News, Computerworld do Brasil, Servicos e Publicacoes Ltda., Rua Alcides Guanabara, 25 10th Floor 20011 Rio de Janeiro, RJ Brazil. Phone: (021) 240-8235. Telex: 2130830WORLD BR.

Mexico: Richard Small, Computerworld de Mexico, Ocasal 21-1, Colonia Roma, Mexico City 7 D.F. Phone: (903) 514-4218. (905) 514-4309. Telex: 1771300 ACHAMEL 1777899 ACHAMEL.

Spain: Neil Kelley, Computerworld/Espana, Gravia, 13, Madrid 4. Phone: 231-23-65, 231-23-86, 231-23-88. Telex: 47844CW E.

Denmark: Preben Engell, Computerworld/Denmark, Gæmel Strand 50, 1202 Copenhagen K. Phone: 01-1234-11. Telex: 27668 cwden.

Sweden: Bengt Marfeldt, Computerworld/Sweden, Nova Media AB, Västergatan 55, 11539 Stockholm. Telex: 818509 NOVACW.

Italy: Denise Comberi, Gruppo Editoriale Jackson, s.r.l., Via Ronellini 12, 20124 Milano.

Second-class postage paid at Framingham, Mass., and additional mailing offices. Computerworld (ISSN 0010-4841) is published weekly, except February (5 issues), April (5 issues), May (5 issues), June (5 issues), August (7 issues), September (5 issues), October (7 issues), November (6 issues), December (4 issues) and a single combined issue for the last week in December and the first week in January by CW Communications, Inc., Box 680, 375 Cochituate Road, Framingham, Mass. 01701.

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POSTMASTER: Send Form 3579 (Change of Address) to Computerworld, Circulation Dept., Box 680, 375 Cochituate Road, Framingham, Mass. 01701.

GE Finds Way Into PBX Market

By Jim Bartimo

CW Staff

ALBANY, N.Y. — General Electric Co. has begun selling and leasing a number of voice/data private branch exchange (PBX) systems, including Intecom Corp.'s IBX and the Siemens Communication Systems, Inc. GX-1000 and GX-250.

GE does not manufacture a voice/data PBX of its own. While selling others' PBXs will put it in competi-

tion with those PBX makers, admitted Donn D. Dears, general manager of GE's Instrumentation and Computer Service Department, "we expect customers to come to us because we offer service and systems planning."

He added, "We will add and drop [PBX] systems, as the industry changes, to remain state of the art."

GE's Integrated Communications Services branch will sell and install PBX-centered systems and provide customers with application assistance, system planning and communications integration services, a GE spokesman said last week.

The company's Instrumentation and Computer Service Department will offer a nationwide network of service locations to provide on-site or depot service support for telephone interconnect equipment. Other

service is offered for data communications and data processing equipment.

The PBX equipment that GE now offers includes the Intecom IBX switch providing voice and data communications with features that include IBM 3270 terminal emulation, Ansi X.25 and compatibility with certain local-area networks, including Xerox Corp.'s Ethernet. GE will also sell the Siemens SD 192, 232 and GX-100 and GX-250; the Lexar Corp. UTX 1200 and 5000 PBX; and equipment from Mitel Corp.

Sales will be aimed at campus installations such as colleges and office parks as well as internally within GE.

Typical installation prices will range from \$800 to \$1,300 per line. More information is available from General Electric at Suite 500, 80 Wolf Road, Albany, N.Y. 12205.

The Bomb That Wasn't?

WASHINGTON, D.C. — A telephone bomb threat followed soon after by a loud noise last Wednesday night at a Department of Defense (DOD) computer training facility in the U.S. Naval District Yard was apparently a hoax.

The Naval District Washington Commander received a phone call by someone claiming to represent an organization called the FMLN, who said a bomb was in the vicinity of the DOD Regional Data Automation Center, a spokesman for the Navy said. The Federal Bureau of Investigation described

the FMLN as an umbrella group of Salvadoran rebels. Six minutes after the 11:58 p.m. phone call, a loud noise was heard.

Navy fire and security personnel and the Washington Metropolitan Police bomb squad searched the area but could find no evidence of an explosion. There was no damage to the computing center or surrounding areas, the spokesman said.

The computing center is used for training DOD personnel. "There is nothing highly secret there," the spokesman said.

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A couple of years ago there was no such animal as a high-performance sort program for VM/CMS. As a result, certain kinds of processing were just plain impossible with the system. It's a miracle that VM/CMS survived at all.

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The best way to find out what this revolutionary new sort program can do for you is simply to try it. You'll be amazed at how little VTime, TTime, Elapsed Time and SIOs it requires. You'll note a sharp drop in response times and a surprising increase in system throughput.

2. FINE-FEATHERED FEATURES. SyncSort CMS liberates programmers. Using the program's full range of features, you can often produce a simple report in one day rather than five. These can do the following:

- Select relevant records;
- Reformat records on output;
- Perform summaries of designated numeric fields;
- Produce reports with pagination, headings, dates.

3. GREATER VERSATILITY. SyncSort CMS is a bird for all seasons:

- It can be invoked from other COBOL, PL/1 or BAL programs.
- It sorts CMS, SAM (OS or DOS) or VSAM files.
- It dynamically allocates space on TDSK.

4. TOP-FLIGHT SERVICE. Ours is the best in sorting. More than 85% of all inquiries are resolved within 24 hours.

If you'd like to realize the full potential of VM/CMS, give us a call, and we'll introduce you to SyncSort CMS. It's a great chance to replace a vulture with an eagle!

They're Paying \$10,000 for a Hole in the Ground

By Jim Bartimo
CW Staff

NEW YORK — In this city of skyscrapers and luxury high rises, some businesses are paying up to \$10,000 a year to rent a cramped, rat-infested hole in the ground. And they're glad to do it.

The holes are actually tunnels that run under the city's streets. The tunnels carry concrete ducts that string data networks together, connecting the computer systems at different office buildings.

The intricate maze of conduits that crisscross under Gotham's streets are rapidly filling up with coaxial, fiber optic and other types of cable.

But several major problems beset those that would run their cable in a major metropolis. For example, "sometimes you go down into the sewers and find that someone is in your space," observed Eric Loyty, manager of field engineering for fiber-optic cable company Siecor Corp. of Hickory, N.C.

Then there's the fact that the companies laying the cable "have to work at night so you don't stop traffic, and that affords you all the benefits of New York at 3 a.m.," Loyty pointed out. "You have to keep drunks from falling in the manhole or jumping in."

Siecor is providing the cable that will eliminate some local data circuits between the New York and American stock exchanges. The Securities Industry Automation Corp. (Siac) — the automation subsidiary of the two exchanges — is planning the network that will carry data over a triangular architecture from Water St. to Wall St. The fiber-optic and coaxial cable will allow "one leg of the network to function if another one fails," a Siac spokesman said.

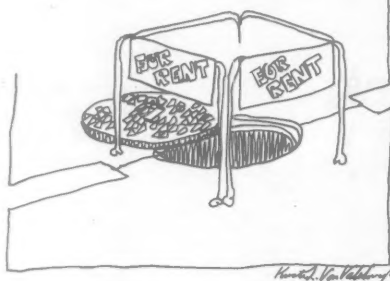
When bank vice-president Harvey Hershkowitz began connecting four of Chase

Manhattan Bank's buildings together in a Wang Laboratories, Inc. Wangnet local-area network, he didn't bargain for some of the problems he encountered.

"It's like another world underground," Hershkowitz said. "When you run cables underground, you're dealing with a hostile environment. The cable has got to be jacketed with thick steel so rats can't bite through it. It also has to be sealed against moisture because Con Edison produces a lot of steam to heat the skyscrapers."

Other Problems

Renting the conduit and laying the cable are problems in themselves. The ducts are rented by Empire City Subway — a division of New York Telephone Co. — and the city must also be paid. Permits must be received from the city, the subway system and the building management of the structures to be wired.



"Approval for some of these permits can take a long time," Hershkowitz said, "as long as several months."

And before you hire one of the 10 or so companies with a map of the ducts and the authority to go underground to lay your cable, you had better have insurance and be prepared to post a bond "in case you damage someone else's equipment in the street cut," Hershkowitz added.

When the cable-layers begin their work, they will probably be overseen by field engineers from the cable and networking companies as they pull the cable from one manhole to the next and splice cables together. According to Loyty, splicing fiber-optic cable, unlike coaxial cable, requires more precision.

But coaxial cable also has its problems. "It's a different technology," Hershkowitz said. "You can't bend it back too far or you interrupt the data transmission."

Whatever the type of cable used, there will probably be plenty of bandwidth left over for expansion, so the process is not repeated too often. "We have plans and hopes to run voice and maybe video on the network," the Siac spokesman said.

When the process is over and your network is running, all you need do is remember to pay your monthly rental bills — which could run up to \$10,000 per year once you've covered the city, sewer and building management. But the savings from having eliminated dedicated telephone lines will make up for that cost, one network user said.

But since Empire City Subway is a subsidiary of New York Telephone, New York's billing may change. "It will be interesting to see who ends up with the ducts when [AT&T] divests," Loyty said.

Software Tapes Ruled Taxable

(Continued from Page 1)

ware in-house, the tax would again not have applied because the programmer would have provided a service rather than a tangible good.

Meanwhile, on Aug. 11, the Maryland Court of Appeals, the state's highest court, rendered a 32-page decision upholding that state's contention that sales tax is due on any prewritten software program. The decision, involving a case brought by Equitable Trust Co., overturned a lower court decision that ruled in favor of the user. Other details on the case were not available at press time.

Court and legislative action on the sales tax issue is pending in several other states. A case is reportedly working its way through the lower courts of South Carolina, where a county court has ruled that all software is taxable.

The Michigan Supreme Court is currently mulling whether it will hear a user's case in which a distinction is made for tax purposes between mainframe and game software. The state is appealing a lower court ruling that upheld the user's claim that custom and prewritten software should be exempt.

And in California, bills have been introduced into the state legislature that would tax custom software as well as prewritten software, which is currently taxed.

In all, 18 states exempt prewritten and custom software from sales or use taxes; 28 states apply the tax to either or both types of software.

Need for State Funds Seen Real Issue

(Continued from Page 1)

to be considered intangible, and therefore untaxable, or "the tangible element of what is essentially a personal or professional service transaction, which is also intangible," Palenski said.

"But it's sticky, because there's software and then there's software," Palenski added, noting that commercial game software and mainframe software "are really quite different." J. Allen Hufft, vice-president of University Computing Co. (UCC) of Dallas, agreed with Palenski: "The states are looking for any means they can use to stay in the black."

However, Hufft claimed that the

tax laws pertaining to software are so vague in many states that it is "usually unclear just what is taxed and what isn't." Hufft said tax regulations are particularly unclear as they relate to software maintenance. This alleged obscurity notwithstanding, UCC levies the sales tax, passing it on to users as part of the cost base, Hufft said.

Lobbyist's View

In California, Carole Murphy, vice-president of Software Module Marketing, Inc. of Sacramento, is a member of an industry and user task force and lobby group "trying to make sense out of tax laws as they ap-

ply to software." Like UCC's Hufft, Murphy criticized existing tax regulations as ambiguous, especially where they apply to software maintenance.

"The regulations have to be fine-tuned to the 1980s," she said. "Some vendors assess the tax in situations where others simply do not. The state might come in and audit, but you might get away without paying," she said.

"We're not saying we shouldn't pay taxes on software, necessarily. But let's get the rules perfectly straight. . . . We're saying let's legislate, not litigate," Murphy concluded.

Niosh to Continue Studying VDT Safety

(Continued from Page 1)

pared by a National Academy of Sciences panel of experts that concluded VDTs have no adverse effects on an operator's vision [CW, July 18]. The panel of scientists was convened at Niosh's behest to examine the literature on the effects of VDTs, such as visual and muscular stress and fatigue.

The panel reported that there exists "no scientifically valid evidence that the use of VDTs per se causes harm, in the sense of anatomical or physiological damage, to the visual system." It recommended that research on the effects of "all jobs — including but not limited to VDT work — be given priority over research with a narrow focus on what

is stressful or not stressful about VDT work per se."

Speaking for Niosh, Johnson said he was for the most part in agreement with the panel's findings. "It was a good report, prepared by an excellent panel, and a number of their recommendations we're in agreement with."

Point of Disagreement

But "our point of disagreement is that [the report] seems to suggest that further research in the area of possible effects of VDTs on vision is unwarranted. We believe there is a need to continue and complete our research efforts."

Niosh began its research into VDTs three years ago, when it started

looking at the ergonomics of VDTs and found "less than optimum design of the terminals, as well as incomplete attention to the office environment," Johnson said.

Niosh is currently doing laboratory research and in 1984 will begin to examine "a number of issues in office work, with VDT as one of those issues."

In the face of concern over dangers posed by VDTs to pregnant operators, the agency is in the preliminary stages of research on the effects of VDT use on a woman's reproductive system. The study is scheduled to begin sometime this fall, once an acceptable population for the research has been established, according to a Niosh spokesman.

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AT&T Strike Begins to Take Toll on Customers

By Peter Bartolik
CW Staff

With little apparent progress last week toward settlement of the nationwide strike against AT&T, some nervousness was expressed by companies that depend on new phone line installations.

Rolm Corp.'s president, M. Kenneth Oshman, announced last Tuesday that the private branch exchange (PBX) manufacturer's revenues for the current quarter will be "adversely affected" because the company expects delays tying its equipment into AT&T lines.

Timeplex, Inc. said profits will be down because AT&T remarks some of the company's data communications equipment. Reportedly, about 26% of Timeplex's sales were to AT&T during the fiscal year ended June 30; the company does not expect first-quarter losses "under any circumstances."

The negotiating teams for AT&T and the three striking unions finally met across the bargaining table last week. But the only significant development by press time was the decision last Monday by the 42,000 members of the International Brotherhood of Electrical Workers (IBEW) employed at Western Electric manufacturing plants to join the rest of the union in the walkout.

John Geoghegan, a spokesman for AT&T in New York, said of the walk-

out by IBEW members at Western Electric, "Western is not our only supplier."

Already on strike were some 525,000 members of the Communications Workers of America (55,000 of whom work at Western Electric); another 58,000 members of the IBEW; and 50,000 members of the Telecommunications International Union. Union affiliations cross organizational and geographical boundaries.

About 300,000 supervisors and management personnel remain on the job, according to AT&T.

Effect on Vendors

While Rolm will continue "to occupy our work force productively" and continue with installations in progress, Oshman said, AT&T's ability to provide central office trunks and tie lines has been sharply reduced. He said revenues and earnings for the first quarter ended Sept. 30 are expected to slip as a result, with the full impact hinging on the length of the strike and amount of service provided in the interim.

Timeplex President Edward Botnick said his company, which had revenues of \$43.7 million during the last fiscal year, has frozen hiring, but will not lay off any of its 750 employees.

Another PBX manufacturer, Northern Telecom, Inc., said it has not felt any impact to date and does

Large Users Say Long Strike Would Impact Their Plans

Despite AT&T's assurances that the automation of 97% of its business will keep the system running smoothly, new installations seem certain to suffer.

At New England Telephone Co., according to spokesman Chuck Reardon, repair work and installation service depends on the availability of the work force.

Three large data processing operations contacted last week said they have not experienced any problems with data transmission, but are concerned about the impact a prolonged strike will have on planned installations and servicing.

Richard Crane, director of operations for Gillette Co. in Boston,

said the company had felt some impact on new installations, but he declined to indicate the extent. No data transmission problems have developed, but Crane said, "it's very early in the strike."

Arnold P. Chirichetti, director of technical services for the Boston-based John Hancock Mutual Life Insurance Co., is not concerned at this time "only because we do not have a major [installation] effort going on."

At Citibank in New York, spokesman Mark Boada said no problems have been experienced with either voice or data, but installation service "at this point is a minor problem," with some delays experienced.

not expect any over the long term. According to spokesman Ken Bomar, the company itself does not have much interaction with Bell companies and would not expect anything other than "isolated" problems.

One other service that depends on the availability of localized telephone service, MCI Telecommunications Corp.'s long-distance calling

service, has not been impacted to date, according to spokeswoman Helen Peterson. "We expect that if the strike was prolonged, we would feel the effects, as any user would," she said. MCI has received assurances from various Bell operating companies that commitments made to date will be met, according to Peterson.

IBM Sites Found Wasting Months of Software

(Continued from Page 1)

helpful tool in relieving the backlog, the managers said.

Of those installations now using development aids, there was a wide disparity in the productivity improvements realized, the survey noted. Users of Pansophic Systems, Inc.'s Easytrieve, for example, experienced improvements ranging from 0% to 100%, while users of Cincom Systems, Inc.'s Mantis reported productivity improvements ranging

from 20% to 300%. The results indicate that the ways in which productivity aids are used is as important as the nature of the tool itself, the study concluded.

Managers also indicated that they expect to devote more effort to the early design phases of a project while reducing coding time. Consequently, programmer productivity improvements rate lower than design improvements on their list of priorities. Forty-one percent of the managers

plan to devote more effort to specification and analysis, while 21% expect to reduce the amount of coding required to develop an application.

End-user computing accounted for only about 9% of the applications developed in the sites surveyed. However, while managers indicated that up to 30% of their departments' applications could eventually be created by users, they still ranked end-user development low on their list of potential benefits, preferring instead

to hire and train their own staffs.

The discrepancy could be due to the attitude that even user-developed applications still require DP resources for support and maintenance, the study theorized.

Nevertheless, a large number of respondents noted the importance of user participation in applications development, particularly through prototyping. The trend is toward an extended design phase with active user participation and reduction of the coding process through the use of automated generators.

Packaged applications ranked relatively low on the list of priorities for reducing the backlog, the study found. Despite the fact that most users expect to increase their use of such packages in the future, they cited lack of flexibility as a major drawback to the effectiveness of packages. One respondent suggested the availability of products allowing a form of systems generation, rather than requiring that coding be added to existing packages.

In contrast to the common assertion that structured design is an effective productivity aid, the managers surveyed ranked it last on the list of methods for reducing the backlog. The managers indicated that while these methods save coding and testing time, they require a greater design effort. Structured methods are most useful for inexperienced staff, several said.

The survey report, "Application Development in Practice," is available for \$55 from Techtran at 72 Cummings Point Road, P.O. Box 10212, Stamford, Conn. 06904.

Bill Would Delay Access Charge Plan

WASHINGTON, D.C. — Just before Congress went home this month, Sen. Arlen Specter (R-Pa.) introduced legislation that would delay the Federal Communications Commission (FCC) access charge plan one year, until Jan. 1, 1985.

Several other bills designed to modify the plan in various ways have also been introduced in the House of Representatives and the Senate. The FCC decision calls for levying several billion dollars in local telephone company costs on users of local telephone company networks; those costs are currently paid exclusively by long-distance users through the charges collected from them by long-distance carriers.

The transfer of charges is designed to discourage the use of bypass services by lowering long-distance rates. Most of the pending bills would require communications users to contribute to the upkeep of local networks even if they employ bypass facilities for some or all of their traf-

fic. For example, S. 1677, a bill sponsored by Sen. Frank Lautenberg (D-N.J.), would require contributions from all private systems that provide telecommunications service essentially similar to service provided by carriers that connect to the telephone exchange.

SBS Plans VFX Service

McLEAN, Va. — An analog voice and low-speed data communications service said to promise the user substantial savings has been announced by Satellite Business Systems (SBS).

The Virtual Foreign Exchange (VFX) service is scheduled to become available Oct. 1 unless the Federal Communications Commission objects.

The service will give the user a specified amount of calling time each month between given cities for a stated price that SBS said will be 5% to 20% below what AT&T charges for

Another measure, H.R. 3647, authored by Rep. Edward J. Markey (D-Mass.) and Thomas A. Luken (D-Ohio), would transfer the local telephone company expenses more gradually to local users and exempt bypassers who operate "completely private systems."

Foreign Exchange Service, a similar offering.

In addition, SBS claimed, VFX requires less traffic to prove cost-effective than AT&T's Foreign Exchange Service and brings savings to a broader range of customers.

If the customer uses more calling time than it has subscribed for at the VFX rates, the excess is billed at SBS Message Service (MS-1) rates, which SBS said are as much as 20% below AT&T's rates and 50% below dial-up telephone rates, according to SBS.

AT&T Breakup Seen Affecting Future Negotiations

By Peter Bartolik
CW Staff

The three unions presently striking against AT&T may find that the pending dismemberment of the Bell system will fragment their bargaining power in future years.

Both labor and management expect present negotiations to result in a three-year contract. But after that term, when divestiture of the AT&T system is in effect, "we certainly won't have national bargaining with AT&T and all the operating companies," Jeff Miller, a spokesman for the Communications Workers of America (CWA), said last week.

With the Bell operating companies reformed into seven independent organizations, unions may have to conduct bargaining sessions in seven regions and another with the slimmer version of AT&T itself. Unless the operating companies band together for joint negotiations, the ability of the unions to duplicate the present nationwide walkout would be severely weakened.

The CWA represents about 525,000 workers in the Bell system, and the International Brotherhood of Electrical Workers represents about

100,000. Another 50,000 or so are represented by the striking Telecommunications International Union. Union memberships cross the system's organizational boundaries.

On Their Own

John Geoghegan, spokesman for AT&T in New York, said last week that after contracts are settled for the expected three-year term, individual operating companies will be on their own unless they make arrangements to band together when future contracts must be negotiated.

Miller, spokesman for the CWA in Washington, D.C., said the divestiture has been "an underlining factor" in the strike, and future negotiation policy is "one of the issues on

the bargaining table right now." All seven operating companies will be bound by the contract now being negotiated, "but it's still kind of up in the air how we will bargain in the future."

AT&T's Geoghegan said that divestiture has no direct relationship with negotiations at this time, but "overhangs everything we do." For the first time, AT&T this year included seven regional vice-presidents among its bargaining team in anticipation of the breakup scheduled for January, "because they will have to live with this contract," Geoghegan said.

Chuck Reardon, a spokesman for New England Telephone Co., which will form New York New England

Telephone Co. (Nynex), along with New York Telephone next year, said some people have referred to the present situation as the last nationwide contract, but he said it's too early to come to that conclusion. "One could speculate that maybe seven regional companies might national bargain, but that's just speculation," he said.

For the CWA, Miller said, "it would be helpful" to have joint negotiations with more than one operating company. The reorganization plan hammered out under the insistent eye of U.S. District Court Judge Harold Greene "said it would be OK to bargain with all the operating companies — if all seven agree," according to Miller.

CDC Launches Firm to Develop Supercomputers

ST. PAUL, Minn. — Control Data Corp. last week launched a new company to develop the next generation of supercomputers. It has set a 1986 target date for the delivery of its first computer, a 10-billion floating point operations per second (Flops) scientific processor.

ETA Systems, Inc. will be no more than 40% owned by CDC, with the remaining shares yet to be distributed. A company spokesman did not rule out the possibility that another major vendor could become a principal shareholder.

About \$100 million will be invested in the new company over the next few years, the spokesman said. Its 10G-Flops machine will be more than 12 times faster than CDC's top-of-the-line Cyber 205 and some 60 times faster than the Cray Research, Inc. Cray-1, he claimed.

Part of CDC's commitment to ETA will be the purchase of an unspecified number of ETA processors, which CDC will use for its data network, for remarketing purposes and to service its OEM accounts.

CDC will continue to enhance, market and support its current computer line, the spokesman said, but left open the question of whether CDC will actually compete with ETA's supercomputer line.

Two CDC executives who headed the development of the Cyber 205 have been named to head ETA: Lloyd M. Thorndyke, former senior technical vice-president, and Neil R. Lincoln, former senior consultant for supercomputer development.

ETA, which will be located here, was announced last Thursday at the National Supercomputer Conference at Los Alamos, N.M., by CDC Chairman William C. Norris.



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Youths May Face Prosecution

(Continued from Page 1)

pose system the bank uses exclusively for program development, according to Richard Warner, Security Pacific's director of public relations.

The break-in, which appears to have been engineered by an unknown intruder in Milwaukee, affected none of the bank's account balances and resulted in no unauthorized file changes, Warner maintained.

But in some of their other alleged raids, members of the reputed hacker group are said to have been much more destructive. One of the purported raiders allegedly broke into the Milwaukee School of Engineering's systems about two dozen times and deleted student records and oth-

er files before he was caught and forced to make restitution.

The break-in has been widely reported in the general press and was confirmed last week during an interview with the youths' legal counsel, Paul Paskoski, who characterized the data erasures as a simple accident. Paskoski described his clients as hackers, whose interest in beating data security precautions was strictly "academic, not criminal."

Another of the Milwaukee youths was reported to have entered his name into an unidentified corporation's payroll records and to have received several of the company's paychecks before his misdeeds were finally detected and stopped. But Paskoski dismissed accounts of the

payroll scam as "pure fabrication."

Micros and Modems

Each of the reputed systems attacks involved the use of modems and personal computers, which apparently allowed the youths to dial almost at will into remote, private mainframes through ordinary telephone lines.

In the Los Alamos raid, the youths apparently used GTE Corp.'s Telenet communications network to gain illicit access to one of the lab's Digital Equipment Corp. VAX-11/780 superminicomputers running under VMS, Breen said. The machine and its accompanying systems modules contain only unclassified data and are used routinely as a public information resource by researchers, academicians and other legitimate users throughout the U.S.

When the break-in occurred last June, the recently installed VAX-11 machine was still undergoing testing and development, according to computer security expert Donn Parker, a senior consultant with SRI International, Inc. At the time, the processor was also probably still equipped with its original, DEC-supplied password — SYSTEM — Parker speculated.

"Kids all over the country know the standard passwords that come with all the various computers," Parker added.

Never Posed a Threat

The break-in involving the Los Alamos system never posed even the slightest threat to the security of the laboratory's classified research data and other sensitive files, which are impossible to reach through outside telephone lines, Breen said.

Breen described the laboratory's information system as consisting of three main compartments: one for unclassified material, another for personnel records and a third for classified research information. The three are physically isolated from each other, and only the segment dealing with unclassified data is connected to Telenet, Breen said.

The names of the youthful systems raiders, whose ages reportedly range from 15 to 22, have yet to be made public. The only exception is a 17-year-old area youngster named Neal Patrick, who has been granted immunity from prosecution in exchange for his cooperation with law enforcement authorities.

Local FBI agents are still investigating the Los Alamos case and the related security breaches. If the federal probe uncovers enough evidence to warrant prosecution, the youths could be charged with wire fraud and interstate transportation of stolen goods, the FBI's Craft said.

Craft declined to reveal exactly how the youths obtained the telephone numbers and access codes necessary to retrieve files from the Los Alamos VAX-11 machine and the other compromised systems.

But Robert Campbell, president of Advanced Information Management, Inc., theorized that the perpetrators could have acquired the information from the networks of other hackers, who routinely publish proprietary access codes in electronic bulletin boards.

Parker Finds Nothing Funny About Exploits of 'Hackers'

By Patricia Keefe

CW Staff

There is nothing funny about kids who break into computer systems for kicks, and they should be vigorously prosecuted to set an example for other "network hackers," a nationally known data security expert said last week.

"It's time we stopped calling these kids 'pirates' and 'raiders' and called them what they are — thieves and vandals," insisted Donn B. Parker, senior management systems consultant at SRI International, Inc.

While statistics may not be available to show that lax data security is widespread, Parker believes there is an "epidemic of malicious system hackers" working through dial-up networks.

'Pirate Bulletin Boards'

There are also networks of electronic "pirate bulletin boards" across the country where hackers exchange access codes and numbers and methods for breaking into systems, he confirmed. And in New York, an underground hacker newsletter is appropriately entitled "Tap."

Parker, author of a recently published book called *Fighting Computer Crime*, is concerned that the hackers of today will become the computer criminals of tomorrow. "These are the people who will be programming our bank systems in five or 10 years," he warned. "We have to change their values."

But Parker has little sympathy for the victims of computer raids. "Anyone today [whose unprotected system] gets broken into and suffers pretty much deserves it," he maintained.

Parker noted that a lot of the systems accessible today through public networks contain sensitive data vital to the economic success of the owner firm. Jay BloomBecker, editor of the "Computer Crime Digest" and director of the Los Angeles-based National Center for Computer Crime Data, pointed to a firm that "went from a Fortune 500 company to bankruptcy" as a result of unauthorized access by a group of hackers.

Several data security experts branded as "ridiculous" a reported

'It's time we stopped calling these kids "pirates" and "raiders" and called them what they are — thieves and vandals.'

— Donn B. Parker

suggestion by one of the Milwaukee hackers, who faces possible prosecution for allegedly penetrating a system at the Los Alamos (N.M.) National Laboratory (story on Page 1), that the ease in which unauthorized computer access was gained dissolved the group of any responsibility. The security experts' consensus was that the responsibility for providing system security lies with the system's owner and not the public network.

And it is not as if security measures — both software and hardware — are not available today, BloomBecker said. Parker added, "There are a lot of capabilities to keep most kids out of dial-up access."

The problem lies with the priority-setting of corporate decision makers, according to BloomBecker. "I have not talked to any DP managers who were not aware of the need for security. It's the decision makers who don't understand computers — they say, 'Call us if a disaster happens.'"

'False Security'

BloomBecker speculated that because corporate officials spend millions on leading-edge hardware, software and communications capabilities, they are loath to spend a few thousand more to protect their investment. "They may wonder if the 'add-on' is necessary, lulled by a false sense of security," BloomBecker said.

If more people have the opportunity to commit crime, all things being equal, more crime will be committed, BloomBecker said, commenting on the proliferation of microcomputers and its impact on network hacking.

"Will more kids going to War Games take [how access was gained] more seriously than the adults who go?" he wondered.

Commercial Sites Seen More Open To Invasion

By Jeffrey Beeler

CW West Coast Bureau

WOODBIDGE, Va. — Commercial systems are much more vulnerable to invasion by telephone than government processors like the one recently penetrated by a group of youthful "hackers" in Milwaukee, a computer security expert said here last week.

In the public sector, most systems operating under the same roof are physically isolated from each other to minimize the potential damage from breaches of data security, according to Advanced Information Management, Inc. President Robert Campbell.

In commercial settings, however, physical isolation is only rarely used as a technique for safeguarding data privacy. Private enterprise typically prefers to isolate its systems logically — a software-intensive tactic that can often be defeated by a clever and persistent intruder, Campbell said.

Thus, a data security breach of the sort that occurred last June at a federal nuclear weapons research facility would wreak much more havoc in commercial systems than in their public-sector counterparts, Campbell said.

Campbell's remarks came last week in the wake of reports that a group of Milwaukee youths gained unauthorized access through telephone lines to unclassified data at the Los Alamos National Laboratory located in New Mexico.

The nuclear weapons research center is owned by the U.S. Department of Defense and operated by the University of California.

Asked to explain why most businesses choose to isolate their systems logically rather than physically, Campbell offered three main reasons:

- Physical isolation requires a discrete hardware configuration for each secured system and thus usually costs considerably more than logical separation.

- The alternative to logical isolation prevents systems from communicating with each other and produces other serious performance trade-offs.

- The private sector has a widespread "lack of security awareness," Campbell said. "Defense people have recognized the vulnerability of their data and the need for systems security for nearly three decades. But in the commercial environment, the concept of data protection is still relatively new."

"Most corporations don't have an appreciation of the value of sensitive information. They have no security policy, or if they do, it is entirely inadequate for today's automated environment. The defense establishment has long contended that systems are currently designed with too low a level of integrity to justify trust in logical isolation mechanisms."

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Consultant Outlines Techniques and Tools

By Paul Gillin

CW Staff

OAK BROOK, Ill. — Ineffective software testing, a perpetual headache in many DP installations, can be addressed immediately using some organization techniques and tools that most shops have readily available, according to a software quality assurance consultant interviewed last week.

Wayne Smith, director of quality assurance and business systems at Applied Information Development, Inc., a consulting firm that has developed a testing methodology, outlined critical success factors for improving test procedures in large installations.

The quickest way to improve testing, Smith said, is to set up an independent testing function. "This is the most cost-effective technique we know of for finding bugs," he claimed. The testing group should be separate from the design and programming functions and should develop test plans during systems design and execute test cases against software that has been unit-tested, but has not reached the integration stage.

New Staff Not Required

Independent testing need not be expensive or require new staff, Smith noted. "As a project team gets to be six or eight people, you probably can support one person to handle testing," he said. That person should test against the test plan when needed, find bugs and write reports. He should not do any fixing or programming. When there is no testing to be done, he can work on other projects.

Another immediate benefit is in improving "coverage measures," techniques that measure the degree to which a test case exercises the software. Requirements coverage ensures that every functional requirement of the software is tested. Logic coverage is implemented in the unit testing phase and can be performed in many shops using existing tools.

One of those tools is the Cobol count option of IBM's MVS operating system, which produces a "hit report" for all statements. The goal of the test is to have a hit report greater than zero for every statement, Smith said.

Other products that work with a program's logical flow include SRA Corp.'s Testing Coverage Analyzer Tool; The Analytic Sciences Corp.'s Trailblazer; and Management and Computer Services, Inc.'s Tracmacs.

Data processing often

overlooks the user's actual requirements in a rush to meet specifications, Smith noted. For that reason, an acceptance test by the user is vital before programming begins.

"In reality, expectations have very little to do with what is in the requirements," the consultant said. "It takes more than sign-offs. During design, while the integration test plan is being done, the

users must be developing their own acceptance test plan with their own test cases and expected results."

Acceptance testing prevents major design discrepancies by forcing the user to think twice about what he expects from the program. "It's a disciplined vehicle for him to document his expectations in a way he hasn't before," Smith explained. "Usually, we uncover all

sorts of problems before programming starts, saving a lot of dollars and time."

Other testing procedure improvements take longer to implement, but pay back quickly in time saved fixing programs, Smith said. Test plans should first be integrated into the development life cycle (see story on Page 11).

In order to be effective, test cases should be written

to be as destructive as possible, "and you want to make sure you don't just throw last month's production files against it." Requirements documents should be used by the test planner to create the fewest test cases needed to uncover the most flaws. Documenting the expected results of the tests is critical not only for evaluating results, but for repeatability and regression testing pur-

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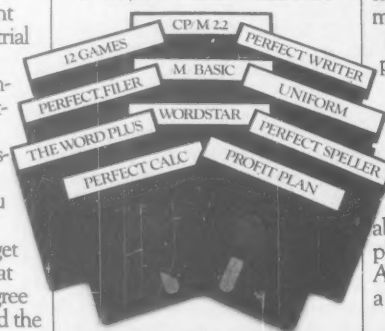
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For Improving Software Testing Procedures

poses, Smith said.

Another area frequently overlooked is controlling the priority and documentation of changes that require more testing, Smith said. "No engineering or manufacturing facility would accept changes to the engineering plan without a testing plan, and the same goes for software," he pointed out.

Change control is a one-time development process

that takes time to formulate, but can be used indefinitely once it is in place. Smith

called change control "a very systemic problem which is intertwined with the manag-

ment philosophy. Management has to understand truly that the key to productivity

is improved quality — which means writing the program right the first time."

Exponential Cost Cited in 'Tack-On' Debugging

OAK BROOK, Ill. — Despite the obvious benefits of creating bug-free programs, surprisingly few data processing installations develop test plans before coding gets

under way, a software quality assurance consultant here said last week in an interview.

The major problem with this "tack-on" approach is

that debugging becomes exponentially more expensive as the project progresses, observed Wayne Smith, director of quality assurance and business systems at Applied

Information Development, Inc. In general, a bug caught during the integration testing phase is about four times more expensive to repair as one caught in unit testing, he said. And that same bug costs 50 to 100 times as much to fix in unit testing as it does in design.

Testing Approach

The test plan includes an overall testing approach that outlines the basic strategy. It also incorporates the administrative procedures that will be used, including library maintenance, problem reporting, change control, coverage analysis and regression testing.

"Testing is very much a clerical and administrative problem rather than a technical problem," Smith said. "Having a well-defined set of procedures is vital."

The next procedure is to create a build sequence, which breaks the system down into logical subsets that are small but functionally complete. Smith emphasized testing and building the system as functional subsets built on top of each other rather than as independent subsystems that are pieced together at the end.

"The build sequence minimizes problems at the integration stage by defining not arbitrary subsystem boundaries like receivables and payables, but modules from all subsystems. This helps to identify integration problems as early as possible," Smith said.

The plan should also include a requirements validation work sheet that ensures that all the requirements are defined in detail and covered by test cases. This is used in meetings with the user to reconfirm the requirements to test and is updated as each phase of the life cycle is completed.

The final part of the test plan is a written list of individual test specifications and expected results.

Because of the scattered nature of software testing, few DP managers are aware of the amount of effort expended on the process, which usually exceeds 40%, Smith said. For this reason, the time taken to develop test data is time well spent. And one of the purposes of the test plan "is to give management some well-defined insight into what the true process of testing is."

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Since disk drive memory capacity is always a concern, once again the idea is to get the most for the money. With two disk drives, Kaypro II gives you 400K for \$1595. With equivalent hardware, an IBM gives you 320K for about \$2800. And Apple IIe gives you 286K for about \$2400.

So once again, Kaypro II delivers.

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The more you love computers, the more tempting it is to recommend a 16-bit vs. 8-bit

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Interfaces	12 Games
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1 Parallel	'read' and 'write'
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In fact, Kaypro II is one of the best sellers in the \$1000-\$5000 price range. And it got there largely because of the enthusiastic word of mouth, and word of press, of computer enthusiasts. Many of whom, after building their own systems, bought a Kaypro II as their second computer.

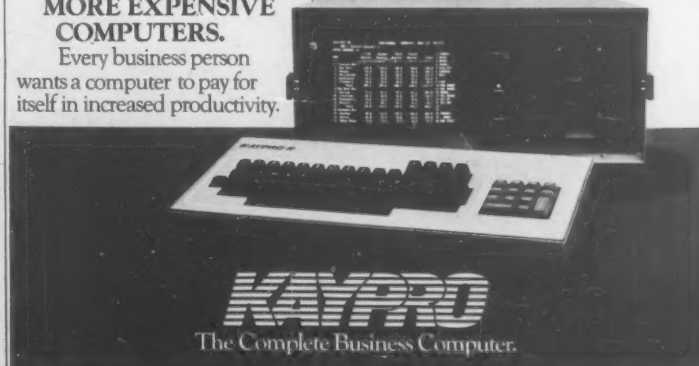
So you certainly won't be alone if you recommend Kaypro II to anyone shopping for a first computer.

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SDC Given Until Oct. 1 to Get MMIS Running

By Patricia Keefe

CW Staff

BOSTON — Fed up Massachusetts officials have told Systems Development Corp. (SDC) to have the commonwealth's Medicaid Management Information System (MMIS) up and running on Oct. 1 — or lose the job to a competitor.

The system was scheduled to be operational on March 31. However, delays in signing the contract, the addition of changes to the baseline system and alleged mismanagement on SDC's part pushed the MMIS implementation date to June 31.

When it became clear that the contractor would not meet that deadline, the state threatened to cancel the contract unless a certain level of progress was achieved by Aug. 1. The vendor met that deadline, so the state extended the final deadline until Oct. 31.

SDC may have to pay substantial financial penalties whether or not it meets the Oct. 1 deadline. Massachusetts "fully intends" to assess SDC for any lateness penalties that the commonwealth incurs from the federal government under the so-called Schweiker Amendment and for the difference in levels of federal reimbursements received as a result of not having a certified MMIS, according to Gene DeLucia, who was hired by Welfare Commissioner Charles Atkins to help SDC stay on track.

SDC's performance to date on the contract is attributable to "mismanagement on their part and underestimating the scope of work and development effort," said DeLucia, who is on leave until September from Wang Laboratories, Inc., where he is computer processing and technologies manager for the Marketing Service Division.

Paid as Deadlines Met

Under the MMIS contract, the commonwealth pays SDC as certain "milestones" in progress are met. When the vendor falls behind in meeting these milestones, the state has two options: Pay the vendor or hold the money to offset any penalties for lateness. The state will "most likely" choose the latter option, resulting in cash-flow problems for SDC, DeLucia said.

SDC has already incurred at least \$2.8 million in lateness fines stipulated by its contract with Massachusetts.

In the event that SDC fails to meet the Oct. 31 deadline, Atkins has approached a number of other MMIS contractors about the possibility of taking over SDC's contract, including Electronic Data Systems Corp. (EDS), the second-place bidder for the original contract. EDS was approached even though it has filed a lawsuit in Superior Court here contesting the award of the contract to SDC in the fall of 1982. The suit has prompted a state Ethics Commission probe into the bid selection process [CW, May 16].

Delays in implementing the MMIS to handle the processing of the 17 million claims filed annually in Massachusetts have cost the state millions in lost federal reimbursements. The federal government usually pays 90% of the project develop-

ment costs, but those reimbursements were stopped in March because of continuing problems, according to Alfred G. Fuoroli, regional administrator for the U.S. Department of Health and Human Resources (HHS). If the state fails to complete the project, the government will take steps to recoup its investment of \$3 million.

After the March 31 deadline was missed, the Welfare Department asked the HHS to waive penalties that could be assessed against the state under the Schweiker Amendment for the delay in implementing the MMIS. However, Fuoroli's office sent the request back to the state, asking for more information.

"We expect them to bring us an

advanced planning document within the next two weeks that contains an absolute deadline [for the comple-

tion of the project], as well as documentation and benchmarking," Fuoroli said.

Timetables Too Short: Expert

BOSTON — Time and time again, efforts to implement Medicaid Management Information Systems (MMIS) across the country have dissolved into a sea of threats, lawsuits and penalties over unmet deadlines and lost contract bids.

The reason for this is simple, according to an MMIS expert recently hired by the state of Massachusetts to bail out its floundering MMIS effort. "For some reason, procurement procedures insist on putting up a system

in six to 12 months," Gene DeLucia said. Contractors, in turn, post bids based on this timetable, even though they know it is not feasible.

The result is that "from Day One," the vendor finds itself working in a "hostile environment on a contract it can't meet."

"Why they keep setting those deadlines, I have no idea," DeLucia said. "I have not seen a large system yet where MMIS has been implemented in less than two years."

DATA GENERAL INTRODUCES THE DESKTOP GENERATION.



Oracle Users Tell Why They Went Relational

By Paul Gillin

CW Staff

BOSTON — Citing flexibility and portability as their key criteria, four users of Oracle Corp.'s (formerly Relational Software, Inc.) Oracle data base management system (DBMS) last week told *Computerworld* why they chose a relational model when they went shopping for a DBMS. The users were interviewed here at Oracle's second International Users Conference.

Although not every user was entirely satisfied with Oracle's performance in their installations (see story below), all touted the software's use of IBM's SQL as an essential factor in their decisions.

Users also cited Oracle's "clus-

tered" relational structure, which is said to increase efficiency by allowing users to mix rows from different tables in one disk block.

Oracle forms the cornerstone for applications programming at The BDM Corp., a McLean, Va.-based professional services firm. BDM this year finished converting its entire development data base to Oracle. The DBMS is used extensively for prototyping prior to moving the application onto the customer's DBMS, Mark Filteau, director of systems design and integration, explained.

"The relational model presents a very logical view," Filteau said. "It's fast to generate screens and reports and easy for nontechnical people to understand."

The company licensed Oracle three years ago in a move that, Filteau said, "was a career decision for me. We took a big chance" converting from Cincom Systems, Inc.'s Total DBMS. Prior to the purchase, BDM studied about 50 DBMS. Oracle was chosen largely because of its use of SQL and its clustered structure, Filteau said.

BDM now uses an IBM mainframe strictly for financial applications with packages from Management Science America, Inc. and McCormack & Dodge Corp. Every two weeks, financial data is downloaded to three Digital Equipment Corp. VAX-11 superminis running Oracle for program development.

On applications in which exten-

sive prototyping has been done, the response from users has been excellent, Filteau said. However, on smaller systems that are not prototyped, "about one-half of the users are balking. They say it's too complicated and not fast enough."

BDM plans to make more use of prototyping in the future. But Filteau warned that prototyping can lead to problems if adequate documentation is not kept.

"Oracle has few self-documenting facilities," he noted. "If you don't keep a unit development folder as you go along, you're going to get into trouble."

Oracle Over Ingres

Carol Meerson, administrative systems analyst at Earlham College in Richmond, Ind., studied the DBMS market for 1½ years before the college got serious about buying a system. After comparing several relational packages, she narrowed her choices down to Relational Technology, Inc.'s Ingres and Oracle. Oracle was chosen after a head-to-head test.

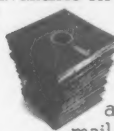
The college licenses two copies of Oracle for its DEC PDP-11/70 mini-computer and VAX-11/750 supermini. One is used on a systemwide basis for general access and the other is devoted to administrative use.

(Continued on Page 14)

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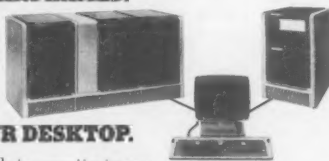
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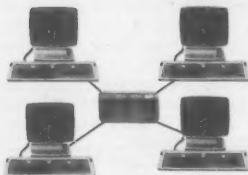
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RSTS User Has 'Real Problem'

BOSTON — While users of Digital Equipment Corp.'s VMS operating system showered praise upon Oracle Corp.'s Oracle data base management system (DBMS) at the Oracle International User Conference here last week, a user of DEC's RSTS was less than enthusiastic.

Oracle under RSTS has been "a real problem," according to Robert Vick, data processing officer at the Baha'i World Center in Haifa, Israel. Primary problems have been with corrupted data bases and indexes and slow performance of several utilities, Vick said.

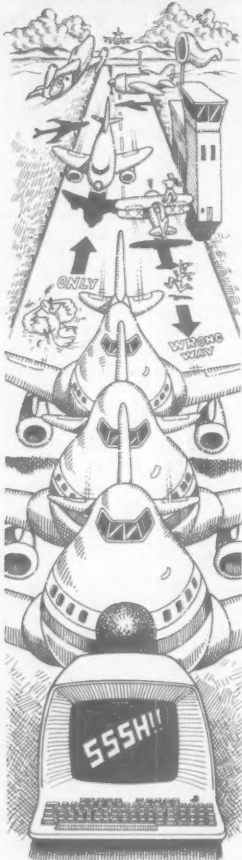
"For example, an index can have a loop stuck in it or data can be completely lost," he said. "We've sometimes had to work from backup."

Vick said service representatives from Oracle Corp., formerly Relational Software, Inc., have continually recommended waiting until Version 3.0 was available on RSTS to solve the problems. "They say it'll be out in six months, but it's been six months ahead for the last 1½ years," he said. An Oracle spokeswoman confirmed that Version 3.0 is not yet available on RSTS, but said availability is planned for the first quarter of 1984.

In the meantime, "we haven't been able to go on-line with a lot of applications," Vick said. Because he cannot access intervals within the DBMS, "I've had to write some of my own intervals."

Nevertheless, the Baha'i World Center remains committed to Oracle. "No other [DBMS] offers its flexibility. I have a feeling these problems will go away with Version 3."

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U.S. Government Aid Asked To Stunt Japan's Tech Strides

By Tom Henkel
CW Staff

LOS ALAMOS, N.M. — Both business people and scientists last week begged the U.S. government for help in stopping Japan from becoming the world technology leader.

Unless lawmakers and government agencies take immediate action, said speakers at the Frontiers of Supercomputing Conference at the Los Alamos National Laboratory here, the dominance of U.S. high technology is in grave jeopardy. The only hope for preserving that supremacy, the speakers repeatedly stated, is revised antitrust laws that would permit greater cooperation among businesses, universities and government agencies, coupled with more government support for high-technology research and development.

Retired Adm. Bobby Inman, now president of the Microelectronics and Computer Technology Corp., said the loss of U.S. dominance in the high-tech arena is dangerous from more than an economic standpoint. It could also mean a loss of strategic weapons superiority. In his keynote address to approximately 150 government, academic and private sector users of supercomputers, Inman said the Soviet Union is working to develop bigger and better computer systems for weapons research and defense systems.

Antitrust Laws

Inman urged lawmakers to act quickly in revamping antitrust laws to allow increased interaction among high-technology companies. However, he cautioned lawmakers to make sure that antitrust laws are not relaxed too much.

Inman urged computer vendors to be less concerned about quarterly profits and more concerned about developing technologies for tomorrow's processors. Aside from simply buying more processors, the government can also aid the development of new technologies by switching from a one-year to a three-year planning cycle. This, he explained, will allow for longer term projects that could have a more profound impact on the country's defense systems and technology markets.

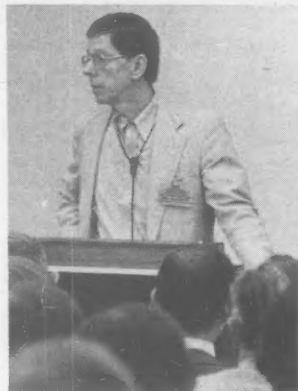
Why Users Went Relational

(Continued from Page 13)

"We see an end to what has looked like insurmountable problems with the applications backlog and a college that can't afford to hire any new people," she said.

Although relational products have been criticized for their consumption of machine resources, Meerson said Oracle has saved a lot of design effort. "In other languages, you spend a lot of time trying to figure out what connects to what," she said. "Oracle eliminates all that."

However, Oracle's documentation has posed some problems. "It gives you some examples with every feature, but you find there's always at least one more thing you can do that isn't spelled out in the manual,"



Technologies such as gallium arsenide devices and Josephson junctions show promise, but it will take years before they can be used in large processors, IBM's John A. Armstrong said last week.

Representatives of the two major supercomputer makers called on the government to help defray the enormous cost of developing new large-scale processing systems architectures.

Both Les Davis, vice-president of R&D at Cray Research, Inc., and Lloyd Thorndyke, senior vice-president of computer systems technology at Control Data Corp., said the current market for the \$8 million-plus supercomputers is not strong enough to support the highly expensive R&D necessary to improve current designs. One way the government could support that R&D, Davis and Thorndyke said, is to buy more supercomputers.

The technologies on which tomorrow's supercomputers will be based remains to be seen. John A. Armstrong, one of IBM's principal researchers, painted a hopeful, but not rosy, picture of the technologies often billed as replacements for silicon-based devices.

Much-touted technologies, such as gallium arsenide devices and Josephson junctions, show promise, Armstrong said, but are still far from being perfected. It may take years before they can be commonly used in large processors, he added.

Meerson said, adding that Oracle's report writer is cumbersome. "You have to create an input file to build a file to drive the final report."

STSC, Inc., a Santa Monica, Calif.-based vendor of software and services, "sees [Oracle] as a potential underpinning for our other products," according to Martin Gardner, DBMS product manager. Gardner cited the product's use of SQL as a guarantee of longevity.

"An associate of mine calls SQL 'the Fortran of data base languages,'" he said. Gardner also called Oracle's portability across a variety of hardware a plus. Of the 2,000 Oracle modules written in C language, Oracle claimed 30 are operating system-dependent.

Speaker Points To Weaknesses In Japanese Plan

LOS ALAMOS, N.M. — Supercomputers are the first target in Japan's plan to beat the U.S. in the high-technology marketplace. And the Japanese have some strong advantages over the U.S. when it comes to technology, said Jack Worlton, Los Alamos Laboratory fellow and chairman-elect of the Executive Board for the U.S. Department of Energy Association for Energy, Systems, Operations and Programming.

However, Japan also suffers from strong disadvantages, of which the U.S. can take advantage, Worlton said at last week's Frontiers of Supercomputing Conference here.

Japan has been getting a free ride since World War II, Worlton said. The country has been spared the high-defense expenditures the U.S. regularly makes, and it has avoided the high cost of social programs, such as Social Security, largely because Japan's population is very young.

The Japanese government has learned it can have a strong impact on its industries' direction by giving subsidies and exerting financial pressure to produce certain items, Worlton said. Japan's philosophy appears to be to analyze what technologies the world will need 10 years from now and then try to make it.

Dramatic Breakthroughs

That philosophy, even if it fails, will probably yield some dramatic technological breakthroughs, Worlton said. "A lot of people have poked fun at [Japan's] fifth-generation project as being too visionary, but it has merit."

However, while Japan appears to be far ahead of the U.S. in coordinating the efforts of corporations, universities and government to work toward a common goal, it also has some significant weaknesses, Worlton said. For example, although Japan has focused on the U.S. supercomputer as its primary target for the rest of this decade, it lacks direct supercomputer experience.

So far, Worlton said, the Japanese have been very successful at building more efficient, highly reliable versions of U.S. supercomputers. But Japan has reached the stage at which it has to invest its money in original research and development, a process, Worlton noted, that is very expensive and time consuming.

In addition, Worlton said, Japan lacks adequate software to function on the processors currently under development; nor does it have the domestic marketing prospects that are available in the U.S.

Worlton contended that the Japanese fifth-generation computer project may not just influence American supercomputer manufacturers like Cray Research, Inc. and Control Data Corp., but may also steal large mainframe contracts from IBM. A logical step for the top Japanese computer makers such as Hitachi Ltd. and Fujitsu Ltd., which already make IBM-compatible mainframes, would be to produce a supercomputer compatible with IBM systems software for use in large scientific applications.

The Sky's the Limit to Architecture Growth Of Large Systems, Speakers Maintain

By Tom Henkel
CW Staff

LOS ALAMOS, N.M. — The sky — or perhaps more appropriately, the land — is the limit on how big a computer system can be. But while the potential exists to build computer systems thousands of times larger than those available today, enormous problems stand in the path of massive development projects.

Architectures for large-scale scientific processors will have to outgrow the current uniprocessor concept to achieve the 1,000-plus order of magnitude performance enhancements necessary to meet the next century's computing needs, speakers agreed at the Frontiers of Supercomputing Conference, hosted here last week by the Los Alamos National Laboratory.

John Pinkston of the National Security Agency (NSA) noted that systems designers have already become comfortable with two- and four-CPU systems. Some scientists, such as Burton Smith, vice-president of research and development at Denelcor, said massive multiprocessing supercomputer configurations could grow in the next century to be the size of a moderate-sized city like Albuquerque, N.M. Such a system would consist of hundreds of processors and many gigabytes of storage.

But before processors start taking over cities, Smith said, serious prob-

Los Alamos Facility Wants Even More Room

LOS ALAMOS, N.M. — While city-size processors may be a long, long time away, the Los Alamos National Laboratory here — which already has five Cray Research, Inc. Cray-1 supercomputers, four older Control Data Corp. CDC 7600 processors, three newer CDC Cyber 825 processors and more than 50 Digital Equipment Corp. VAX-11/780 superminicomputers — is already

thinking about the future.

Richard Ewald, head of the Los Alamos computing center, told last week's Frontiers of Supercomputing Conference that he is already lobbying for more space and possibly a new building to support larger supercomputers in the next decade.

Ewald said a new computing facility at Los Alamos could be under way by the late 1980s.

lems have to be overcome. One big problem is memory latency, or the negation of the edge provided by superfast CPU switching speeds while the system searches for stored data.

Another big problem is parallelism, noted Pinkston along with several other speakers at the five-day supercomputing conference. Roughly defined, parallelism is the task of making each processor in a multiprocessing system work with each other and with the data storage system. In order for a system composed of many CPUs and storage devices to work efficiently, each processor must be linked with all the memory on the

system. And steps must be taken to stop individual CPUs or jobs from tying up system resources that should be available to the entire system.

The immense processors currently being visualized by corporate and university scientists are still very far from being a reality, said George Michael, a researcher with Lawrence Livermore National Laboratory. If they are developed, MIT researcher Jack Dennis said, these enormous processors would be ideal not only for scientific computing, but also for signal and image processing, data base transaction processing and artificial intelligence systems.

Requirement Discussed

Multiprocessing Supercomputers Eyed

LOS ALAMOS, N.M. — Technological breakthroughs, coupled with a rethinking of computer systems architectures, are needed to develop the multiprocessing supercomputers of the next century, John Pinkston of the National Security Agency (NSA) told attendees at the Frontiers of Supercomputing Conference here last week.

The obvious requirements for to-

morrow's supercomputers are faster processors, more memory and a larger word size or addressable memory. But supercomputers are not used like commercial mainframe processors, Pinkston said; the typical user is more sophisticated than his commercial counterpart. He runs more debugging code and fewer simultaneous jobs and develops more in-house software than commercial shops.

Despite their greater sophistication, Pinkston predicted, supercomputer users will demand more specialized systems. Pinkston pointed to a specialized IBM wire-routing system used in the internal design of gate arrays. The microprocessor-based system runs a factor of 40 times faster than one of IBM's larger 3033 processors. The secret to the wire-routing processor's speed is that it was designed for a specific task, whereas the 3033 was designed as a general-purpose processor.

Pinkston maintained that same concept must be employed in supercomputer architectures to achieve the levels of magnitude performance improvements currently being sought by government agencies. But just as important as improved, sleeker processor designs are improved packaging techniques, Pinkston said. Heat dissipation, for example, is a big obstacle to more compact processor designs. To solve that problem, Pinkston said, future systems architectures will employ more innovative ways of getting rid of heat within

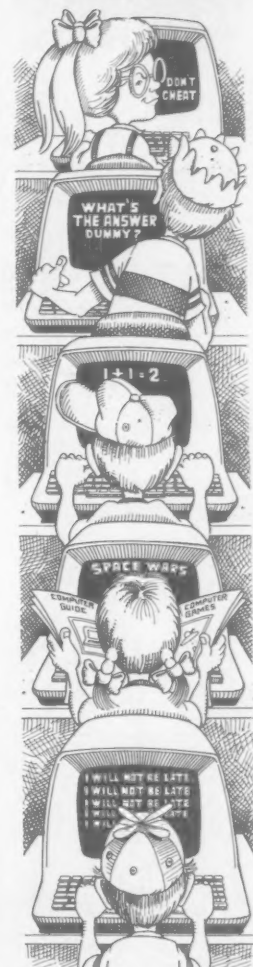


It's time to stop worrying about developing processor architectures and start developing new systems, said CDC's Neil Lincoln.

processors. He pointed to Cray Research, Inc.'s copper conductors and IBM's Thermal Conduction Modules as innovative heat dissipation methods.

However, Neil Lincoln, one of the leading architects of Control Data Corp.'s Cyber 205 and Cyber 200 series supercomputer projects, said it is time to stop worrying about developing theories of new processor architectures and start actually developing new systems. Some progress can be made in developing better systems with existing technology, he said. Working with current tech, Lincoln said, is better than sitting around developing theories without actual products to support them.

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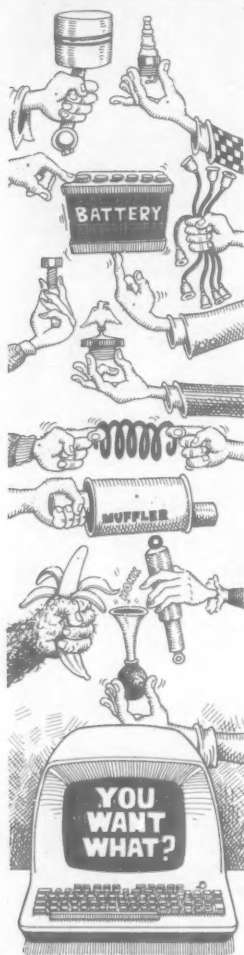
December Debut For CDSI Dems

NEW ROCHELLE, N.Y. — Contemporary Digital Services, Inc. (CDSI), headquartered here, announced last week that it will begin offering a digital electronic message service (Dems) next December.

Dems employs microwave to provide end-to-end data transmission at speeds up to 1.5M bit/sec. It offers business users a way to bypass the technical limitations of telephone company-provided local exchange facilities.

CDSI has been authorized to build and operate a 47-city Dems network. The CDSI Dems will be a carrier's carrier, offering bulk quantities of point-to-point and point-to-multipoint circuits operating at 2,400 to 1.5M bit/sec. CDSI's financial backers include Merrill, Lynch, Pierce, Fenner & Smith, Inc.; Citicorp; Prudential-Bache; Sears-Allstate; and European American Bank.

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Users, Justice Debate Interconnect Standards

By Phil Hirsch

CW Washington Bureau

WASHINGTON, D.C. — Communications users differ sharply with the Justice Department about the need for mandatory network interconnection standards, judging from comments submitted to the Federal Communications Commission (FCC) earlier this month.

Those commenting addressed a two-part Notice of Proposed Rule-making adopted by the FCC in May. One part would require interconnection specifications to be included in all telephone company local exchange tariffs; the other would make a recently formed Exchange Carriers Association (ECA), whose members would be limited to telephone operating companies, the forum for development and modification of interconnection standards and related matters.

The Association of Data Communications Users (Adcu), which said it represents more than 175 companies and educational organizations, told the FCC that all providers of on-line data services should be required to adhere to Bell system interconnection standards. Under the FCC proposal, only local carriers would have to do so.

Adcu also said that MCI Communications Corp., Western Union and all other interexchange carriers should be required to provide interconnection with private users that is "equal in type and quality to that provided by the Bell operating companies, independent telephone companies and AT&T."

But the Justice Department pointed out that FCC authorization of ECA activities does not create any antitrust law immunity, and that if the activities have anticompetitive effects, they will be subject to prosecution by the government under the Sherman Antitrust Act.

The FCC "may be including too many aspects of telecommunications system design within its proposed standardization," the Justice Department added.

IBM Micro Users Get Two Courses

NAPERVILLE, Ill. — Two multimedia training courses that teach people to assemble and operate the IBM Personal Computer are available from Deltak, Inc.

"The IBM Personal Computer: Selecting a System" uses case studies to help potential users decide which devices would best serve their individual applications.

"The IBM Personal Computer: Using the System" goes through a step-by-step process showing how to plug in and operate the keyboard, monitor and printer. Users can also learn how to format and copy a diskette and use Microsoft, Inc. MS-DOS or Digital Research, Inc. CP/M 86 commands.

Courses can be purchased for \$1,750 each or rented for an average cost of \$50 to \$125/mo per course. Deltak is at 1751 W. Diehl Road, Naperville, Ill. 60566.

Datacomm Briefs

ment added. "There are tangible benefits... in permitting diverse solutions to some facets of the interconnection problem. Making compliance with any recommended ECA standards voluntary should alleviate some of the concerns otherwise flowing from such a process."

Calif. PUC Wants Review Of AT&T Reorganization

WASHINGTON, D.C. — Partly because U.S. Federal District Court Judge Harold Greene saddled Pacific Telephone and Telegraph Co. with a debt "substantially more onerous than that of any other unit in the Bell system," the California Public Utilities Commission (PUC) is asking the U.S. Supreme Court to review his recent approval of AT&T's reorganization plan [CW, Aug. 8].

The California commission also objected to Greene's transfer of the Bell operating companies' entire base of installed terminal equipment and the related revenues to AT&T "while burdening the [operating] companies with a multibillion-dollar investment in customer premises wiring — a poor revenue source under current rates."

Last year the high court was asked but refused to consider Greene's initial acceptance of the agreement settling the government's antitrust case against AT&T. This "consent decree" provided the blueprint for the plan

reorganizing the structure of AT&T.

Vermont Petitions FCC To Order AT&T Rate Cut

WASHINGTON, D.C. — Users will suffer unless the Federal Communications Commission (FCC) orders AT&T to reduce its long-distance dial-up rates, the Vermont Department of Public Services told the commission earlier this month.

Vermont is worried about the impact of the FCC's recently adopted access charge decision. If the decision is implemented next Jan. 1, as scheduled, several billion dollars of local telephone company costs formerly collected from long-distance carriers will be levied directly on users of local telephone net services.

Without quick FCC counteraction, Vermont's petition to the FCC said, AT&T will use the access charge ruling as "a pretext to raise its rate of return" or to "de-average" rates — for example, reduce rates for some services but increase them for others so that AT&T garners as much revenue as it is now earning or more. Quick commission action is needed, according to Vermont, because AT&T is scheduled to file tariffs in October reflecting the access charge ruling.

AT&T's position is that "in the first instance," it must set the new rates. Although the FCC can prescribe rates in advance, it may do so only after investigation.



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Managers on the Move



Bob Shepard

BOB SHEPARD has been named vice-president of information systems for Kawasaki Motors Corp. U.S.A. in Irvine, Calif. He will be responsible for company information management, including data processing, coordination of telephone systems and related areas.

Shepard joined Kawasaki in 1977 as director of data processing. He was appointed earlier this year as chairman of the productivity committee, a corporate organization formed to study and improve output.

He graduated from the University of California, Los Angeles with a bachelor of science degree.

PATRICIA A. MUECKE has been

appointed director of management information systems at Tylan Corp. in Carson, Calif. Tylan manufactures and sells equipment used in processing silicon wafers.

In her newly created position, Muecke will be responsible for Tylan's computer operations and data base management. She will integrate all computer functions and expand systems to serve operating and accounting needs.

Muecke has served in a variety of financial positions at Tylan since 1974, including accounting manager.

She is a graduate of the University of Southern California with a bachelor of science degree in business administration.

JOSEPH M. GRAZIANI has been named vice-president of management services for Southern Pacific Co. in San Francisco. He will direct the development of computer applications, office support systems and data center operations of Southern Pacific and its subsidiaries.

Prior to his promotion, Graziani served as general manager of management services.

Graziani joined the railroad as a freight clerk at Delano, Calif., in 1950 and held various positions during the following five years. In 1965 he was assistant supervisor of specialized operations and two years later moved to the newly created management services department,

holding various managerial positions until he was named general manager in June 1982.

He attended the College of Sequoias in Visalia, Calif., and Fresno City College in Fresno, Calif.

JOSEPH E. VIEL has been named director of management information systems for Computer Memories, Inc. in Chatsworth, Calif. Viel will be responsible for directing data processing activities, including the continued implementation of a mechanized manufacturing and financial system.

Viel joined Computer Memories after five years as manager of management information services for Raytheon Data Systems Co. Previously he was manager of manufacturing systems at Vivitar Corp. in Santa Monica, Calif.

Viel earned his MBA from California State University, Dominguez Hills, and his bachelor of science degree from City College of New York.

ROBERT G. MCCARTHY has been promoted to technical support manager, and LOUISE QUINN has been promoted to operations analyst/corporate systems and services for National Grange Mutual Insurance Co. in Keene, N.H.

McCarthy will be responsible for managing and coordinating all activities associated with systems programming functions and network administration. Since joining the company in 1981, he served as computer services manager in data center operations.

McCarthy joined National Grange after serving as computer operations manager at The Foxboro Co., in Foxboro, Mass. He received a bachelor's degree in business management from Johnson and Wales College in Providence, R.I.

Quinn joined National Grange in 1978 as a rater and since 1979 has been associated with corporate systems and services. She is currently working toward an associate degree in management designation from the Insurance Institute of America.



Robert G. McCarthy



Louise Quinn

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Fortune 500 Firm Stresses Training for Micros

SAN DIEGO — General Dynamics Corp., a Fortune 500 company with \$5 billion in annual sales, believes it has discovered a way not only to increase productivity, but also to help employees feel more comfortable using microcomputers to perform inventory control, accounting and personnel management functions.

"To reduce the tension employees feel when put in front of a microcomputer for the first time, it's extremely important they receive proper training on the machines and that the software packages are simple yet useful," according to Tom Davis, software engineer at General Dynamics Data Systems Division here. The division provides computing services and microcomputer training

throughout the company.

"With many software packages, people can't think of an immediate application and hesitate at using the entire system," Davis added.

According to Davis, the initial decision to purchase microcomputers resulted from General Dynamics' desire to increase employee productivity. In early 1982, the company installed four units and began evaluating how well people could adjust to them. When results proved positive and employee productivity improved, additional machines were bought. Currently, 135 Apple Computer, Inc. Apple II microcomputers are in use throughout General Dynamics' West Coast facilities. Davis expects that number to increase by

the end of 1983.

Each employee assigned an Apple computer receives VisiCorp's Visicalc software to perform spreadsheet functions and Apple's Applewriter word processing package, in addition to other packaged software. Employees use the computer systems in every department at the company, including finance, inventory control, personnel and engineering.

The company also makes extensive use of a series of packages known as the PFS family from Software Publishing Corp. These packages include PFS:File, which enables users to custom design forms on the computer screen; PFS:Report, which allows users to print presentation-quality reports from data files that

include calculations and automatic formatting; and PFS:Graph, which allows users to produce color bar, line and pie charts.

Davis said his group completed a 10-week series of training sessions, during which 500 General Dynamics employees received instruction on how to use their Apples and the software bought for them. According to Davis, personnel used the training sessions to familiarize themselves with the software in a nonthreatening environment. The PFS family, he said, was relatively simple to learn, taking about four hours to teach employees all three packages.

'Substantial Amounts of Data'

"As a large organization, we generate substantial amounts of data, and requests for reports are very common," Davis said. "Maintaining that information and producing reports is quite a job. As a result, we've shown our employees how to use PFS:File to record and file data on their computers rather than on paper. They can design any type of form they want and then change that form without reentering the information."

As a result of the successful implementation of microcomputers at General Dynamics, the company initiated a program that permits a salaried employee to buy an Apple and accompanying software programs for use at home. Workers pay for the system through an interest-free, automatic payroll deduction plan.

"The availability of easy-to-learn software that people feel comfortable working with has contributed greatly to the overall success of using microcomputers as management information systems at General Dynamics," he concluded. "As use of these machines increases within the company, software will become even more important in helping employees overcome the fear of technology, while at the same time making them more productive."

Meet to Target Legal Protection

TEMPE, Ariz. — A national symposium on "The Computer Software Dilemma: Proposed Structures for Legal Protection in the 1980s" will be held Sept. 26 by the Arizona Law & Technology Institute of the Arizona State University College of Law. The symposium will be held at the Mountain Shadows Resort in Scottsdale, Ariz.

A day-long dialogue on alternative forms of software protection will be given by Duncan M. Davidson of Cambridge Venture Partners in Denver; Roy N. Freed of Brown, Rudnick, Freed & Gesmer in Boston; and James A. Sprowl, a research attorney at the American Bar Association Foundation and an author in the field.

The symposium fee is \$175 before Aug. 26, \$225 after Aug. 26; it covers materials, a reception and lunch. More information is available from Community Relations Coordinator, College of Law, Room 105, Arizona State University, Tempe, Ariz. 85287.

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International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

AUSTRALIA

MELBOURNE — The Australia and New Zealand Banking Group Ltd. has become the first site in Australia to install IBM's System 370 Extended Architecture (XA). It also claims to be the first bank in the world to run Release II of Swift (Society for Worldwide Interbank Financial Telecommunications) under MVS/XA. The operating system took four weeks to install.

MELBOURNE — The first machines from the IBM System/36 lottery are beginning to arrive here. (Orders for the new system were so strong that IBM conducted a lottery to determine who would get their new machines first.) One of the first to receive the System/36 will be book publisher and distributor Thomas C. Lothian Pty. Ltd.

BRAZIL

SAO PAULO — Brazil should not be afraid to import new technology, the head of Brazil's Special Department of Informatics said during the Third Congress of the Brazilian Computing Society. Col. Joubert de Oliveira Brizida cited statistics showing that Brazil's manpower resources include more than enough hardware and software technicians to handle the challenge.

RIO DE JANEIRO — A new data communications company has been formed here that will rely solely on Brazilian technology. ABC-Kuhn Sistemas' first products include flight simulators for Embraer Aeronautics of Brazil and statistical multiplexers, sources said.

JAPAN

TOKYO — Nippon Electric Co. (NEC) moved into the Japanese word processor market with the announcement of a "soft-hard" package called PCword-M for the Japanese IBM Personal Computer. NEC reportedly devised a new method that incorporates the American alphabet with Japanese and Chinese Kana-Kanji ideographic characters. The NEC package, consisting of a dedicated keyboard, software and an add-on random-access memory board, is priced at \$670.

TOKYO — Panafacom Ltd. has introduced a Unix III-based operating system named Unicus for its U-1000 minicomputer, whose installed base exceeds 15,000. Unicus is the first Unix oper-

ating system developed by Digital Research, Inc. (U.S.A.) for a minicomputer product line in Japan. It incorporates a scientific engineering library, full screen editor and remote job entry linkage to the mainframe.

TOKYO — Fujitsu Ltd. has unveiled a software package that links its Facom M mainframes with its FM series of

personal computers. The software is called TTY File Transfer/Full Screen and is priced at \$45.

SWEDEN

STOCKHOLM — Datatronic, the Swedish vendor of the Commodore microcomputer that recently threatened to move its operations out of Sweden, is offer-

ing 128K-byte Commodore PET 700 microcomputers to the Swedish government at the low price of \$12.50 each. The price was set to protest regulations that obligate the Swedish government to choose always the best buy for the money. It is thought that Datatronic will make up for its low microcomputer prices with its software pricing.

WEST GERMANY

MUNICH — The worldwide information technology market will exceed \$37 billion, the German consulting firm of Diebold Deutschland AG reported at a recent conference here. Diebold consultants said Europe will account for 30% of this spending. West Germany will account for 8%.

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Integrated System Helps Shape Business School

LOWELL, Mass. — Keeping pace with the constantly changing office systems and equipment that business school graduates must learn to use after graduation is a problem confronting every business-oriented school.

For Boston's Fisher Junior College here, the solution was found in a Wang Laboratories, Inc. VS 80 Integrated Information System.

The Information Processing Center at Fisher is alive with activity seven days and five nights a week, as students learn everything from the fundamentals of word and data processing to the process of booking airline reservations.

Fisher's quest for the right computer system began with a recognition by the trustees in early 1981 that word processing capability was an urgent need. Along with three other top administrators, Richard Boudreau, Fisher's president, immediately began comparing the equipment available and soon settled on Wang because of its competitive pricing.

Founded in 1903 as a vocational school offering courses in typing, shorthand and penmanship, Fisher gradually broadened its curriculum and attained official junior college status in 1952. It presently enrolls more than 600 young women in the day school program at its Boston campus and another 4,200 men and women in continuing education programs there and at 33 other locations around the state.

Though many liberal arts courses are offered, the accent remains on practical learning for career preparation, with associate degrees granted in such fields as business administration, accounting, fashion merchandising, travel and tourism administration and business computer programming.

Patricia Brown and Brenda Miccio, two teachers who have been deeply involved with the center since the VS 80 with 16 terminals went on-line in the summer of 1981, have helped to shape the center into the effective learning environment that it is to-

day. Many of the continuing education students, for example, are older people who have not grown up with electronic technology and who may be uncomfortable with or actually afraid of the systems.

"We have to start with them," Miccio says. "One tactic I've used has been to mistreat the equipment by punching keys at random to show the students that they can't hurt the system — and that it can't hurt them."

Brown notes that foreign students for whom English is a second language make up another group with special needs. Although these students are often technically oriented, they may have serious linguistic problems following a lecture, espe-

cially if the terminology becomes too cumbersome. Again, the teachers must slow the pace.

One of the reasons for the rapid progress is that Fisher has made a strong commitment to optimum teaching and learning arrangements. Brown and Miccio explain that the only important variable in teaching the day school students is hands-on time with the equipment. "The Wang VS 80 is an excellent system," Brown says, "but if you don't have the right situation in the lab, students can't use it to advantage."

When the system was first installed, labs were organized with two students per terminal. The configuration proved ineffective and in spite of the expense the college now runs

all its labs on a one-to-one basis.

In order to increase students' direct experience with the machines, Fisher has also added a fourth credit hour to its Basic and Cobol courses. The result is a full 42 hours per semester of hands-on lab time.

The teachers are unanimous in praising the VS 80 as a highly teachable system. Birdwell speaks of its "built-in success," while Brown calls the computer "very user-friendly — an excellent system from an instructional point of view. Said Miccio, "On the DP side, it's very easy to use. For student learning it's beautiful because it is menu-driven — it steps them through. When teaching, I don't need to bother, initially at least, with technical manuals."

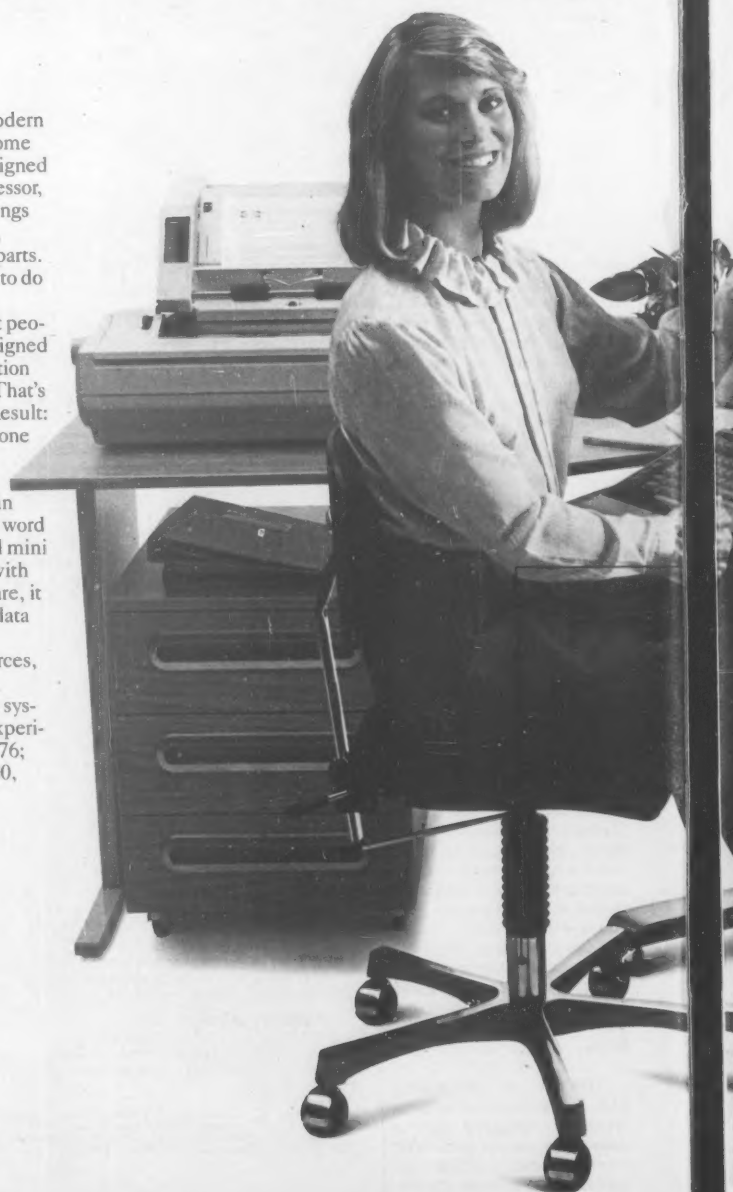
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Report Outlines 87 Terminals, 51 Micros

CHERRY HILL, N.J. — Data Decisions, Inc. has released a 26-page report that describes 87 user-programmable terminal systems and 51 personal computers intended for general-purpose processing in a data communications environment.

All products listed in "Personal Computers and User-Programmable Terminals" connect to communications networks via an RS-232C interface and have software that allow them to interact with a processor.

Each product description lists the programming languages supported, defines what kind of microprocessor and word size is employed, specifies the range of memory capacity, how many peripherals can be supported simultaneously, type of transmission mode and the interface needed.

The report can be purchased for \$29 from Data Decisions, 20 Brace Road, Cherry Hill, N.J. 08034.

Customers Order Directly From Stock

Automation Eases Book Firm's Inventory Process

KING OF PRUSSIA, Pa. — Automation at a book distributing company here brought the expected efficiency in accounting, order processing and inventory control. But it also made it possible for customers to order books directly from stock.

Rittenhouse Book Distributors, Inc. specializes in the health sciences and distributes books to hospitals, libraries and bookstores throughout the U.S., with its heaviest concentration of sales in the East Coast area from Florida to Maine.

Its inventory includes some 30,000 titles in medicine, nursing, dentistry, pharmacy, veterinary medicine and

allied sciences.

After calling the company's computer and entering their account numbers and passwords, customers can order books, immediately learn of the status of any title in Rittenhouse's inventory and receive hard-copy printouts of both orders and status reports.

The system is flexible enough to accept most CRTs or hard-copy terminals, telexes or slave-line printers.

"We set this up on an experimental basis with the Bowman Gray School of Medicine in Winston-Salem, N.C.," company Treasurer Daniel Foster explained, "and they love it."

"Our prices are the same as the

publishers' [prices]," Foster pointed out.

"What we offer is the single source for a library or bookstore to purchase many different publishers' books. One purchase order to us, one invoice from us and one place to make returns. Service is the only thing we have to sell, and we must be responsive to our customers' needs to get the business," he said.

Rittenhouse, which has 39 employees but serves more than 7,000 customers, started on the path to automation by using a data service bureau handling daily invoicing and accounts receivable. Then, as business expanded, it began shopping

around for an in-house computer. "It was back in 1975," when Rittenhouse had 784 customers, Foster said, "that we purchased our first computer and began an association with Keystone Information Systems [a systems house in Pensauken, N.J.]."

Foster Wrote Programs

From the very beginning, Keystone had convinced Foster that he should write his own software, using his computer as more than just an adding machine. With training provided by Keystone, Foster wrote his first programs, at times linking his computer with theirs via telephone so that Keystone could offer direct on-line assistance.

Eventually, Rittenhouse purchased an NCR Corp. Applied Digital Data Systems, Inc. (AddS) Mentor minicomputer, in part, to lower maintenance fees, said Judd Van Dervoort, Keystone's president.

The CPU has 384K bytes of main memory and a 60M-byte disk; it supports 28 terminals, including two in Philadelphia at Rittenhouse's retail store some 15 miles away. A patchboard on the computer room wall facilitates switching of data display locations.

Rittenhouse now uses the computer for all applications except the payroll. Handling of back orders, in some cases for titles that will not be published for years, was a new challenge.

"With our inventory both consigned and owned, and with price changes every six months, and with some customers on consignment with us, and some with variable discount structures with orders that need to be 'committed' although not to be shipped for months, and a myriad of other things, our inventory is not the simplest thing in the world to lick," Foster said. "When we finally got rid of the old inventory cards with their reserve slips tacked on them, it was a great day."

Adjusts Inventory

When a title is found, Rittenhouse adjusts its inventory, and such adjustment automatically produces an exceptions list that records variations in inventory. This procedure is not only helpful in tracking the pattern of variations, it is useful in the prevention of thefts from which Rittenhouse has suffered.

Every title's history is kept on disk — its sales history, back order history, minimum order points, returns from customers and so on. This data and the instant access to it have made customer service's life easier, as well as planning the ordering of textbooks for the big autumn push. Knowing how a book has sold, and to whom and when, makes inventory control much easier.

Dedicated phone lines link the bookstore and the distributor, and one port is reserved for the dial-up procedure. Foster keeps an AddS data display terminal and line printer at home and does a lot of programming work "when the telephone doesn't bother me," he said. The disk is backed up each day on magnetic tape.

information processor.

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digital

The CDP: Is It Worth Earning?

Q After 16 years in DP management and an M.S. in telecommunications, I considered taking the exam for a Certificate in Data Processing (CDP). To see what I might expect, I sent off for a CDP exam guide. I was amazed to find what the Institute for Certification of Computer Professionals (ICCP) finds relevant for CDP testing.

Because I started out wiring IBM 407 boards, I am more than familiar with ancient history. In some cases, particularly what they categorize as "telecommunications," their right answer is only true in an IBM sense. In a generic sense, they are often wrong.

I would lay odds that a new graduate in computer science could not pass the CDP test as it is now constituted since a great deal of the material is dated and IBM-oriented. As long as this situation exists, the CDP will never be taken seriously except by the IBM old-timers who delight in arcane, and now largely moot, knowledge.

Is the CDP worthwhile? If so, under what conditions is the possession of the CDP beneficial?

A The CDP exam guide to which you refer is one author's concept of what is contained in the CDP exam, not necessarily that of the ICCP. However, I would expect the author to have a good handle on exam content.

I'm more or less in agreement with your assessment of the exam. I once stated in this column that "the CDP is a commendable effort to provide a mechanism by which an individual can show the extent of his or her knowledge and experience in data processing and information management"; but "in my opinion, the CDP examination does not accurately measure one's DP/management information systems (MIS) knowledge" [CW, March 10, 1980]. My comments still stand.

As to its worth, you're probably better off with the CDP than without it. Until the format is changed and the work experience and education requirements are upgraded to be consistent with other professional certifications, the CDP will continue to receive a lukewarm to neutral endorsement from the computer community. The business community in general will continue to ignore it.

Our profession is in need of a truly professional certification program, and I hope that the charter member societies of the ICCP will take the bull by the horns and do it. My fear is that the CDP in its present format (multiple choice, machine graded, minimal education/experience requirements) has too much revenue potential. This revenue would be eliminated if the exam were upgraded to a peer evaluation format.

Q A month ago, I sent my resume to 100 companies located primarily in the Midwest. I have not received one positive response; most companies have not responded at all.

I recently earned an M.S. in computer science and have three years' work experience. Are there any jobs

out there? I'm beginning to think there aren't.

A The recession has forced so many people to adopt the shotgun approach to job hunting that this approach has lost its effectiveness. The sheer volume of resumes, applications and inquiries has caused personnel departments to handle correspondence more casually and in a less timely manner than they did three years ago.

Lost in the shuffle are qualified applicants for real openings in MIS. I've directed people to companies that I know to have MIS openings, and they are told by the personnel department that the company is not

hiring.

The personnel department must reflect the company line, which in many cases is a hiring freeze. When a partial hiring freeze is in effect, MIS openings are given low visibility. Nevertheless, these openings do exist. You just have to get your resume to the right person, who is usually in MIS and is usually delighted to learn of your interest.

I'm already anticipating repercussions from what I'm about to say, but if I were in your shoes, I would be more direct and call the MIS department to make sure that my resume is properly reviewed. My rationale: The logjam in personnel departments is real and will persist for an indefinite period; there are jobs wait-

Turnaround Time By Larry E. Long

ing to be filled; and there are people like you ready to fill them.

Long, president of Long and Associates, is a consultant, lecturer and author in the field of information services. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, P.O. Box 880, Framingham, Mass. 01701.

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Calendar

Week of Sept. 18

Sept. 21-23, Washington, D.C. — **Data Base Management Systems: Concepts and Guidelines.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 21-23, Springfield, Ill. — **How to Develop a Long-Range DP Plan.** Contact: Brandon Systems Institute, 4720 Montgomery Lane, Bethesda, Md. 20814.

Sept. 21-23, New York — **Data Communications: An Introduction to Concepts and Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 21-23, Denver — **Software Quality Assurance.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Sept. 21-23, Washington, D.C. — **How to Build and Use a Data and Information Resource Directory.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

Sept. 21-23, Washington, D.C. — **Structured Testing: Tools and Techniques.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Week of Sept. 25

Sept. 26-27, Lansing, Mich. — **Managing Information Centers Effectively.** Contact: Association for Systems Management, International Headquarters, 24587 Bagley Road, Cleveland, Ohio 44138.

Sept. 26-27, New York — **Introduction to the Tools of Structured Analysis.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Sept. 26-27, Washington, D.C. — **Local Area Networking: Voice, Data, Telemetry and Video Information.** Contact: Phillips Publishing, Inc., Suite 7315N, 7315 Wisconsin Ave., Bethesda, Md. 20814.

Sept. 26-27, Chicago — **SAS Procedure-Writing Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Sept. 26-27, New York — **IMS/VS Dump Reading.** Contact: Data Base Management, Inc., 1075 Tolland Tnpk., Manchester, Conn. 06040.

Sept. 26-27, New York — **Productivity in MIS: Defining Measurements and Establishing Programs.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 26-27, Washington, D.C. — **The Telecommunications Pricing**

Institute. Contact: Executive Enterprises, Inc., 33 W. 60th St., New York, N.Y. 10023.

Sept. 26-27, San Francisco — **Structured Maintenance: Reducing Costs with a New Methodology.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 26-28, Chicago — **Systems Analysis and Design: Concepts and Effective Practice.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 26-28, Boston — **Screen Design.** Contact: QED Information Sciences, Inc., QED Plaza, P.O. Box 181, Wellesley, Mass. 02181.

Sept. 26-28, Chicago — **DP Project Management: A Practical Approach.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 26-28, Springfield, Mass. — **Systems Design for the '80s.** Contact: Brandon Systems Institute, 4720 Montgomery Lane, Bethesda, Md. 20814.

Sept. 26-28, New York — **Fundamentals of Data Communications.** Contact: The American Management Associations, 135 W. 50th St., New York, N.Y. 10020.

Sept. 26-28, Los Angeles — **Data Communications: An Introduction to Concepts and Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 26-28, Washington, D.C. — **Data Dictionaries: Concepts, Contents and Uses.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

Sept. 26-28, Los Angeles — **Advanced DP Management Methods and Techniques in the '80s.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 26-28, St. Louis — **Personal Computers and Networking.** Contact: Center for Advanced Professional Education (Cape), Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Sept. 26-28, Washington, D.C. — **Financial Planning Using Graphics and Microcomputers.** Contact: Control Data Management Institute, 6003 Executive Blvd., Rockville, Md. 20852.

Sept. 26-28, Los Angeles — **Data Base Management Systems: Concepts and Guidelines.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 26-28, Washington, D.C. — **Micro and Home Computers: Technique and Applications.** Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Sept. 26-28, Dallas — **Fundamentals of Data Processing.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 26-28, Hasbrouck Heights, N.J. — **Data Communications Systems.** Contact: Center for Advanced Professional Education (Cape), Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Sept. 26-28, Washington, D.C. — **Office Automation: Strategic Planning, Design and Implementation.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 26-28, Los Angeles — **Introduction to Office Automation: Concepts, Techniques and Applications.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 26-28, Chicago — **Computer Operations Management: Effective Techniques.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 26-28, San Francisco — **Basic Systems Analysis.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Sept. 26-28, New York — **Microcomputer Systems: A Guide to Selection and Application.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 26-28, Washington, D.C. — **Computer Operations: Effective Production Scheduling and Control.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being given Sept. 28-30 in Chicago and San Francisco.

Sept. 26-29, Washington, D.C. — **IMS/VS Application Development Facility II.** Contact: Data Base Management, Inc., 1075 Tolland Tnpk., Manchester, Conn. 06040.

Sept. 26-29, Salt Lake City, Utah — **AUUA, Inc. Fall Conference.** Con-

tact: Gail DeLaurier, Small Business Administration, 5906 Bedford Lane, Clinton, Md. 20735.

Sept. 26-29, Fort Lee, N.J. — **Vsam: Its Structure and How to Use It.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Sept. 26-29, New York — **The Third Annual Conference on Control, Audit and Security of IBM Systems.** Contact: MIS Training Institute, Inc., 4 Brewster Road, Framingham, Mass. 01701.

Sept. 26-30, Melbourne, Australia — **The Tenth Australian Computer Conference.** Contact: Australian Computer Conference, 10 ACC Registration, P.O. Box 29, Parkville, Vic., Australia 3052.

Sept. 26-30, Houston — **Financial Modeling — A Structured Approach.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Sept. 26-30, New York — **Computer Performance Measurement and Capacity Planning.** Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Sept. 26-30, Anaheim, Calif. — **Structured Analysis and Design Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being given Sept. 26-30 in Chicago.

Sept. 26-30, Atlanta and Portland, Ore. — **Structured Analysis and System Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Sept. 26-30, Smuggler's Notch, Vt. — **Personal Computing for MIS: Stage-Based Management Techniques.** Contact: Nolan, Norton and Co., Dorothy L. Clarke, Executive Education Programs, One Forbes Road, Lexington, Mass. 02173.

Sept. 26-30, Washington, D.C. — **Quality Assurance and Testing Workshop.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

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Naisbitt Among Keynoters ICCCM Meet Set for April 9-12

SUNNYVALE, Calif. — The Institute for Software Engineering (ISE) here has announced the preliminary agenda for the sixth annual International Conference on Computer Capacity Management (ICCCM), which will be held April 9-12 in Washington, D.C.

The theme of the 1984 ICCCM will be "Information Engineering — The New Frontier." It will explore the changing role of information management in the 1980s and 1990s.

Keynote speakers will include John Naisbitt, chairman of the Naisbitt Group and author of *Megatrends*; William Synnott, senior vice-president of the First National Bank of Boston and author of *Information Resource Management*; Edward A. Murphy of Hughes Helicopter Corp.; and Jack van Kingsbergen, president of Boole and Babbage, Inc.

Planned session topics geared for DP professionals and senior corporate management include: information as the asset of the 90s; planning for micros in the work place; the organizational implications of information; implementing an information center; new computer architectures; the banking industry's approach to information engineering; decision support systems/strategic planning; government perspectives on information management; the meaning of "performance"; I/S's role in an overall business plan; and "MVS/XA — Evolution or Revolution?"

The conference will feature industry-specific panel discussions, presentations by noted futurists and senior management personnel, debates by researchers and three day-long tutorials on implementing information engineering, managing the information asset and planning for the unknown.

The conference attendance fee is \$395 for ISE members, \$495 for nonmembers, \$150 for full-time ISE faculty members and \$295 for speakers. Tutorials are an additional \$195; one-day fees are \$195.

Further information on the conference can be obtained from the ISE, 510 Oakmead Pkwy., Sunnyvale, Calif. 94068.

Further information on the conference can be obtained from the ISE, 510 Oakmead Pkwy., Sunnyvale, Calif. 94068.

Society for Info Management Slates September Meet

SAN DIEGO — The Society for Information Management (SIM) will hold its 15th annual conference here at the Hotel Del Coronado on Sept. 11-15.

Organized around the theme of "Gaining a Competitive Edge through the Human Dimension," the conference agenda includes 20 program sessions covering a range of topics, including technology trends, occupational stress and employee management techniques.

The conference and workshop registration fees total \$875 for SIM members. More information about the event can be obtained from SIM, Suite 600, 111 E. Wacker Drive, Chicago, Ill. 60601.



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pages. Ask for a Business Computer Specialist. Or write to Tom Rappath, Hewlett-Packard, Dept. 03183, 19447 Pruneridge Avenue, Cupertino, CA 95014. In Europe, write to Henk van Lammeren, Hewlett-Packard, Nederland B.V., Dept. 03183, P.O. Box 529, 1180 Amstelveen, The Netherlands.



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Microcomputers

A Survey of 43 Systems
From 20 Vendors

Charts Begin
On Next Page

By Tom Henkel
CW Staff

Some analysts have compared the microcomputer business to the burgeoning automobile industry 50 years ago — there are a lot of vendors, a lot of unique ideas and a great deal of variation in terms of price and quality.

The micro industry is hot and very unsettled. With more than 150 vendors currently in the market, it is still unclear which will emerge on top. Some industry watchers feel the exploding industry is heading for a consolidation period, where the many smaller firms will be consumed by larger ones. Still others contend that the boom in micros is just a phase. The security and organizational problems posed by micros will force corporations to switch to intelligent workstations supported

by a centrally located memory.

The volatility of the microcomputer market can be seen in the tenuous positions of its top competitors. At the end of 1982, International Data Corp. (IDC) listed IBM as the top microcomputer company in terms of sales. But IBM grabbed the top slot with a mere 15% of total microcomputer sales. In fact, the combined sales of the top five micro vendors (IBM; Commodore Business Machines, Inc.; Apple Computer, Inc.; Tandy Corp.; and Osborne Computer Corp.) account for only 59% of all the micros sold last year. The remaining 41% were purchased from a host of other vendors, according to IDC.

That compares with the stable mainframe market, where IBM controls better than 70% of the domestic market.

Right now, most microcomputers are purchased for business or professional use. Ralph Wagner, president

of Microsource Financial, Inc., a Woburn, Mass., microcomputer dealer, estimated that about 80% of his clientele are business users.

The problems presented in professional applications are many. A clear standard has yet to be developed in the microcomputer market. There are many different system architectures and operating systems that cannot communicate with each other. Further, even some processors that are billed as compatible with big-name processors have different file formats that make it impossible simply to swap floppy disks among machines. And currently, little software exists to link micros to corporate mainframe data bases effectively.

Micro security is also an emerging issue in many firms. Robert P. Campbell, president of Advanced Information Management, Inc. in Woodbridge, Va., explained that a micro on an executive's desk can contain

more sensitive information than the corporate mainframes. Executives use electronic spreadsheet programs to do product planning. They also use a micro's word processing features to develop sensitive reports.

Jerry Isaacson, director of the Educational Resource with the Computer Security Institute in Northboro, Mass., added that there is a growing danger that corporations could lose valuable data and many man-years of programming efforts if floppy disks were destroyed by a natural disaster or stolen. Currently, Isaacson said, few firms have recovery plans, or even backup, for micro data.

On the home front, micros appear to be on a strong upswing. IDC reported that home use of micros increased 900% during 1982. The market research firm predicted growth will be strong for home micros through 1985, when the demand starts to slow.

Micros: 43 Machines

Charts Continue
On Page 32

IBM		
System	Personal Computer	XT
Characteristics		
Address Space	16 Bit	16 Bit
Communications Protocols	Synchronous, Asynchronous, SDLC	Synchronous, Asynchronous, SDLC
Memory Size in Bytes (Minimum-Maximum)	64K	128K
Purchase Price (Basic Configuration)	\$3,353	\$5,715
Operating Systems	PC-DOS, CP/M 86	PC-DOS, CP/M
I/O Ports	1	1
I/O Channel Speed (Bit/Sec)	To 9,600	To 9,600
DP Support?	Yes	Yes
WP Support?	Yes	Yes

COMMODORE BUSINESS MACHINES, INC.			
System	Pet 4032	CBM Business System	Super Pet
Characteristics			
Address Space	8 Bit	8 Bit	8 and 16 Bit
Communications Protocols	Asynchronous	Asynchronous	Asynchronous
Memory Size in Bytes (Minimum-Maximum)	32K	32K	96K
Purchase Price (Basic Configuration)	\$1,295	\$4,285	\$1,995
Operating Systems	Embedded DOS	Embedded DOS	Embedded DOS
I/O Ports	1	1	1
I/O Channel Speed (Bit/Sec)	300	300	300
DP Support?	Yes	Yes	Yes
WP Support?	Yes	Yes	Yes

OSBORNE COMPUTER CORP.			
System	Osborne 1	Osborne Executive I	Osborne Executive II
Characteristics			
Address Space	8 Bit	8 Bit	8 and 32 Bit
Communications Protocols	Asynchronous	Asynchronous	Asynchronous
Memory Size in Bytes (Minimum-Maximum)	64K	128K	256K
Purchase Price (Basic Configuration)	\$1,795	\$2,495	\$3,195
Operating Systems	CP/M	P-System, CP/M Plus	CP/M 86, MS-DOS, P-System
I/O Ports	1	1	1
I/O Channel Speed (Bit/Sec)	300	300	300
DP Support?	Yes	Yes	Yes
WP Support?	Yes	Yes	Yes

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DIGITAL EQUIPMENT CORP.		
System	Rainbow 100	Professional 300
Characteristics		
Address Space	8 and 16 Bit	16 Bit
Communications Protocols	Synchronous, Asynchronous	Synchronous, Asynchronous
Memory Size in Bytes (Minimum-Maximum)	64K-256K	256K
Purchase Price ¹ (Basic Configuration)	\$2,695	\$3,995
Operating Systems	CP/M 86/80, MS-DOS	P/OS, USCD Pascal
I/O Ports	2	3
I/O Channel Speed (Bit/Sec)	To 19.2K	To 19.2K
DP Support?	Yes	Yes
WP Support?	Yes	Yes

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XEROX CORP.		
System	820-II	16/8
Characteristics		
Address Space	8 Bit	8 and 16 Bit
Communications Protocols	Asynchronous, Binary Synchronous, 3270 or 3780	Asynchronous, Binary Synchronous, 3270 or 3780
Memory Size in Bytes (Minimum-Maximum)	64K	64K-256K
Purchase Price ¹ (Basic Configuration)	\$2,595	\$3,395 ²
Operating Systems	CP/M 80	CP/M 80, CP/M 86, MS-DOS
I/O Ports	2 Serial or 2 Parallel	2 Serial or 2 Parallel
I/O Channel Speed (Bit/Sec)	To 19.2K	To 19.2K
DP Support?	Yes	Yes
WP Support?	Yes	Yes

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APPLE COMPUTER, INC.

System	Apple II and Apple II+	Apple III
Characteristics	8 Bit	8 Bit
Address Space	8 Bit	8 Bit
Communications Protocols	Synchronous, Asynchronous	RS-232C
Memory Size in Bytes (Minimum-Maximum)	16K-48K	128K-256K
Purchase Price (Basic Configuration)	\$1,530 ¹	\$3,495 ²
Operating Systems	DOS	SOS, CP/M
I/O Ports	2	2
I/O Channel Speed (Bit/Sec)	To 19.2K	To 19.2K
DP Support?	Yes	Yes
WP Support?	Yes	Yes

1. For a 48K-byte basic configuration.
2. For a 128K-byte basic configuration.

TANDY CORP.'S RADIO SHACK

System	TRS-80 Model 1	TRS-80 Model II
Characteristics	8 Bit	8 Bit
Address Space	8 Bit	8 Bit
Communications Protocols	Asynchronous	Asynchronous
Memory Size in Bytes (Minimum-Maximum)	4K-48K	380K-1.8M
Purchase Price (Basic Configuration)	\$2,500 ¹	\$3,499 ²
Operating Systems	TRS DOS	TRS DOS
I/O Ports	2	1-5
I/O Channel Speed (Bit/Sec)	To 19.2K	To 300
DP Support?	Yes	Yes
WP Support?	Yes	Yes

1. For a Level II processor with 16K bytes of random-access memory.
2. For a processor with 64K bytes of main memory, CRT and floppy disk drive.

INTERTEC DATA SYSTEMS CORP.

System	Compustar	Superbrain II
Characteristics	8 Bit	8 Bit
Address Space	8 Bit	8 Bit
Communications Protocols	Synchronous	Asynchronous
Memory Size in Bytes (Minimum-Maximum)	64K	64K
Purchase Price (Basic Configuration)	\$1,995	\$2,495
Operating Systems	CP/M	CP/M 2.2
I/O Ports	2	2
I/O Channel Speed (Bit/Sec)	To 9,600	To 9,600
DP Support?	Yes	Yes
WP Support?	Yes	Yes

TELEVIDEO SYSTEMS, INC.

System	TS806	TS816
Characteristics	8 Bit	8 Bit
Address Space	8 Bit	8 Bit
Communications Protocols	SDLC	SDLC
Memory Size in Bytes (Minimum-Maximum)	64K-128K	64K-128K
Purchase Price (Basic Configuration)	\$7,195	\$12,995
Operating Systems	CP/M 2.2	CP/M 2.2
I/O Ports	6	16
I/O Channel Speed (Bit/Sec)	800K	800K
DP Support?	Yes	Yes
WP Support?	Yes	Yes

HEWLETT-PACKARD CO.

System	HP 85	HP 85 HP 87	HP 125
Characteristics	8 Bit	8 Bit	8 Bit
Address Space	8 Bit	8 Bit	8 Bit
Communications Protocols	Asynchronous	Asynchronous	Asynchronous
Memory Size in Bytes (Minimum-Maximum)	16K-32K	64K-640K	64K
Purchase Price ¹ (Basic Configuration)	\$2,750	\$1,795	\$2,750
Operating Systems	Integrated Into the System	HP, CP/M	CP/M
I/O Ports	4	4	2
I/O Channel Speed (Bit/Sec)	300	300	To 9,600
DP Support?	Yes	Yes	Yes
WP Support?	Yes	Yes	Yes

1. Base list price.

ZENITH RADIO CORP.

System	Zenith 89	Zenith 90	Z100
Characteristics	8 Bit	8 Bit	8 and 16 Bit
Address Space	8 Bit	8 Bit	8 and 16 Bit
Communications Protocols	3270, Asynchronous	3270, Asynchronous	Synchronous, Asynchronous
Memory Size in Bytes (Minimum-Maximum)	48K-64K	48K-64K	128K-768K
Purchase Price (Basic Configuration)	\$2,895	\$3,195	\$3,249
Operating Systems	CP/M 2.2, USCD Pascal	CP/M 2.2, USCD Pascal	Z-DOS, CP/M 86
I/O Ports	3	3	3
I/O Channel Speed (Bit/Sec)	To 9,600	To 9,600	To 384K
DP Support?	Yes	Yes	Yes
WP Support?	Yes	Yes	Yes

CROMEMCO, INC.

System	System One	System Two	System Three	D-Series System One	D-Series System Two	D-Series System Three
Characteristics	8 Bit	8 Bit	8 Bit	16 Bit	16 Bit	16 Bit
Address Space	8 Bit	8 Bit	8 Bit	16 Bit	16 Bit	16 Bit
Communications Protocols	3780, 3741, 2980, 2770 and C-Net	3780, 3741, 2980, 2770 and C-Net	3780, 3741, 2980, 2770 and C-Net	3780, 3741, 2980, 2770 and C-Net	3780, 3741, 2980, 2770 and C-Net	3780, 3741, 2980, 2770 and C-Net
Memory Size in Bytes (Minimum-Maximum)	64K-512K	64K-512K	64K-512K	256K-2M	256K-2M	256K-2M
Purchase Price (Basic Configuration)	\$3,995	\$4,695	\$6,995	\$4,995	\$5,995	\$7,995
Operating Systems	Cdos or Cromix	Cdos or Cromix	Cdos or Cromix	Cdos or Cromix	Cdos or Cromix	Cdos or Cromix
I/O Ports	1-16 Serial	1-64 Serial	1-64 Serial	1-12 Serial	1-64 Serial	1-64 Serial
I/O Channel Speed (Bit/Sec)	To 19.2K	To 19.2K	To 19.2K	To 19.2K	To 19.2K	To 19.2K
DP Support?	Yes	Yes	Yes	Yes	Yes	Yes
WP Support?	Yes	Yes	Yes	Yes	Yes	Yes

Continued From Page 31

TEXAS INSTRUMENTS, INC.	
System	TI-99/4A
Characteristics	8 Bit
Address Space	8 Bit
Communications Protocols	Asynchronous
Memory Size in Bytes (Minimum-Maximum)	16K-48K
Purchase Price (Basic Configuration)	\$1,500
Operating Systems	Internal
I/O Ports	1
I/O Channel Speed (Bit/Sec)	300
DP Support?	Yes
WP Support?	Yes

FRANKLIN COMPUTER CORP.	
System	Ace 1000
Characteristics	8 Bit
Address Space	8 Bit
Communications Protocols	Asynchronous, Synchronous
Memory Size in Bytes (Minimum-Maximum)	64K
Purchase Price (Basic Configuration)	\$1,595
Operating Systems	Apple DOS 3.3
I/O Ports	None
I/O Channel Speed (Bit/Sec)	None
DP Support?	Yes
WP Support?	Yes

CONVERGENT TECHNOLOGIES, INC.	
System	1000
Characteristics	16 Bit
Address Space	16 Bit
Communications Protocols	Synchronous
Memory Size in Bytes (Minimum-Maximum)	128K-1M
Purchase Price (Basic Configuration)	\$3,990
Operating Systems	Ctos
I/O Ports	2
I/O Channel Speed (Bit/Sec)	To 19.2K
DP Support?	Yes
WP Support?	Yes

ALTOS COMPUTER SYSTEMS, INC.	
System	Altos 8000
Characteristics	8 Bit
Address Space	8 Bit
Communications Protocols	Asynchronous, 3780
Memory Size in Bytes (Minimum-Maximum)	64K-204K
Purchase Price ¹ (Basic Configuration)	\$3,620
Operating Systems	CP/M, MP/M, Oasis
I/O Ports	1
I/O Channel Speed (Bit/Sec)	To 1,200
DP Support?	Yes
WP Support?	Yes

1. Base list price.

VECTOR GRAPHIC, INC.	
System	Vector 4
Characteristics	8 and 16 Bit
Address Space	8 and 16 Bit
Communications Protocols	SDLC, Asynchronous, Binary Synchronous
Memory Size in Bytes (Minimum-Maximum)	128K-256K
Purchase Price ¹ (Basic Configuration)	\$7,145
Operating Systems	CP/M, CP/M 86, MS-DOS
I/O Ports	2
I/O Channel Speed (Bit/Sec)	110-9,600
DP Support?	Yes
WP Support?	Yes

1. For a Vector 4 model with two 630K-byte floppy disks and the firm's 7700 printer.

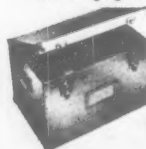
NEC INFORMATION SYSTEMS, INC.		
System	PC-8000	APC
Characteristics	8 Bit	16 Bit
Address Space	8 Bit	16 Bit
Communications Protocols	Synchronous, Asynchronous, Binary Synchronous	Synchronous, Asynchronous, Binary Synchronous
Memory Size in Bytes (Minimum-Maximum)	32K-64K	128K-256K
Purchase Price (Basic Configuration)	\$1,205	\$4,693
Operating Systems	DOS, CP/M	CP/M 86
I/O Ports	1-6	2
I/O Channel Speed (Bit/Sec)	To 4,800	To 19.2K
DP Support?	Yes	Yes
WP Support?	Yes	Yes

NORTH STAR COMPUTERS, INC.		
System	TSS	Horizon
Characteristics	8 Bit	8 Bit
Address Space	8 Bit	8 Bit
Communications Protocols	Asynchronous, Synchronous	Asynchronous, Synchronous
Memory Size in Bytes (Minimum-Maximum)	128K-1.4M	32K-64K
Purchase Price (Basic Configuration)	\$9,241	\$14,800
Operating Systems	TSS/A, TSS/B, TSS/C	Monitor
I/O Ports	6	None
I/O Channel Speed (Bit/Sec)	9,600	None
DP Support?	Yes	Yes
WP Support?	Yes	Yes

SANYO BUSINESS SYSTEMS CORP.		
System	FDS-1000	MBS Series
Characteristics	8 Bit	8 Bit
Address Space	8 Bit	8 Bit
Communications Protocols	Synchronous, Asynchronous	Synchronous, Asynchronous
Memory Size in Bytes (Minimum-Maximum)	64K	64K
Purchase Price (Basic Configuration)	\$1,995	\$3,493
Operating Systems	CP/M 2.2	CP/M 2.2
I/O Ports	2	2
I/O Channel Speed (Bit/Sec)	To 19.2K	To 19.2K
DP Support?	Yes	Yes
WP Support?	Yes	Yes

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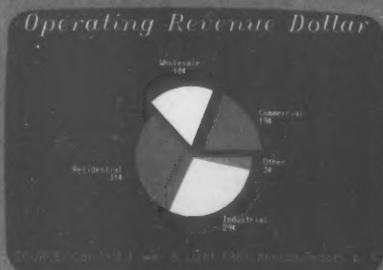
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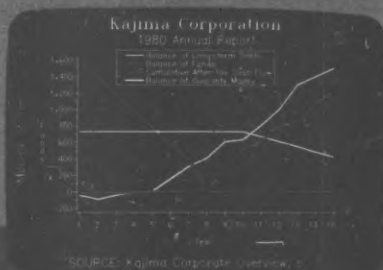
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Choropleth Map of Products

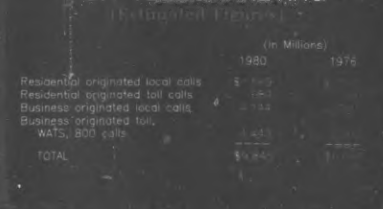


Pie Chart of Revenue

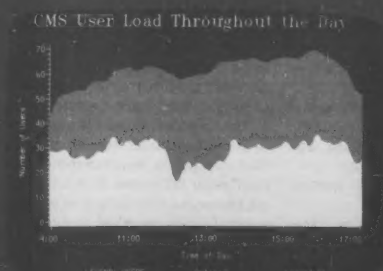


Plot of Funds Year

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Telephone Expenditures



Plot of Load*Time

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EDITORIAL

The Mini Will Survive

Minicomputer manufacturers have had to be fast on their feet for the past several months.

Not necessarily because they want to be, but rather because they have been hard-pressed by two forces: microcomputers eating away at the lower end of their market and mainframes eating away at the high end of their market. As a result, most mini makers, including Prime Computer, Inc. and industry leader Digital Equipment Corp., have experienced substantial drops in earnings [CW, Aug. 15].

Moreover, in the first two parts of the Hardware Roundup that we have been running this month (the third and final part, on microcomputers, begins on Page 29), *Computerworld* profiled 159 mainframes and superminis and 59 minicomputers. Although the number of minicomputers surveyed is a healthy one, it is notable that there were no significant new entries in the product lineup. Mini vendors are still selling systems, but they are the same ones they sold last year and the year before — not a good situation when technology is changing at a rapid pace.

Fortunately, minicomputer vendors have learned a few lessons from the plug-compatible mainframe manufacturers of days past and are unwilling to sit still while the micros and mainframes try to squeeze them out of the picture. Some mini makers, including NCR Corp. and Data General Corp., have adapted to the situation by introducing smaller, microcomputer-based systems designed not to compete in the highly volatile microcomputer market, but rather to expand their minicomputer systems users' options while keeping purchases all in the family. Still others are devoting more and more of their time to scientific and engineering users, who have always been devoted fans of dependable and fast minicomputers.

So while a number of industry pundits and prognosticators boldly proclaim the imminent death of the minicomputer, the mini makers are working hard to adapt to the new market realities. We believe that like the biblical Lazarus, minicomputers will survive, but only after a considerable applications rebirth.

DATA PAST

Five Years Ago Aug. 21, 1978

WASHINGTON, D.C. — The House of Representatives overwhelmingly approved legislation that would place a \$50 limit on customer liability in electronic funds transfer (EFT) transactions. The move brought EFT a step closer to federal control.

— — —

SAN FRANCISCO — IBM was awarded a directed verdict in the *Memorex Corp. vs. IBM* trial in what several observers termed an "unusual" decision by presiding Judge Samuel Conti.

The case had ended in a mistrial a month earlier when the 11-member jury could not reach a decision after 19 days of deliberation.

Conti then granted IBM's request for a directed verdict in its favor even though the jury members were split 9 to 2 in favor of Memorex.

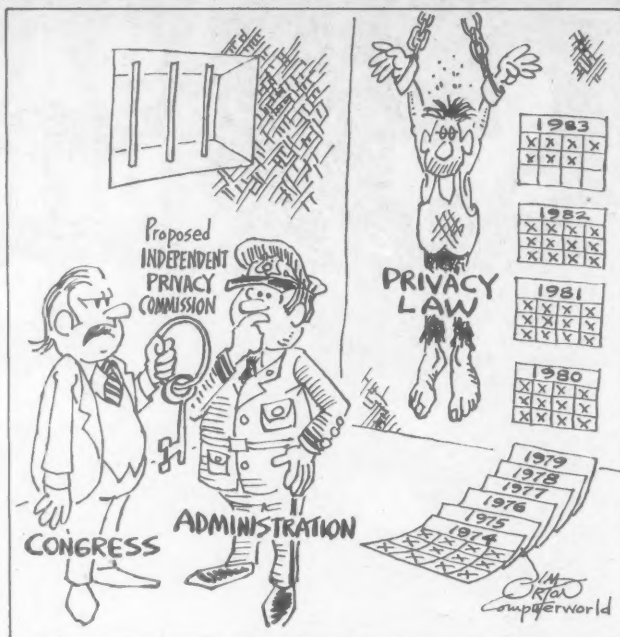
Ten Years Ago Aug. 22, 1973

PROVIDENCE, R.I. — Forty-five state government programmers and keypunch operators took part in a wildcat three-day "sickout" to protest lack of advancement opportunity for programmers and to get action on pay-step increases and other demands.

Almost all the 12 programmers and 33 keypunch operators in the Division of Methods, Central Services and DP came down with the mumps and other maladies to show their dissatisfaction. Computer operators who had earlier received a two-step increase kept their health.

— — —

BOSTON — Researchers from Massachusetts General Hospital used a computer to compile and analyze data that would enable them to predict which teenagers would be likely to turn to drugs.



'Time's Up.'

LETTERS

Understandable Cobol

The sad part of J. Steven Plegge's letter to the editor [CW, Aug. 8] in response to my articles is that it points to the seriousness of the confusion in DP in regard to "clarity coding."

Plegge attempts to refute clarity coding by his example, namely, the desirability of coding '>' over coding 'IS GREATER THAN.' What that really is an example of is his failure to understand what I was saying in the articles "Turn to Yesterday's Cobol to Up Productivity" [CW, June 27] and my reader commentary "Coding Clarity the Key to Productivity" [CW, July 4].

What I was referring to was abbreviations of data names, paragraph names and in comments. He, in turn, used a reserved word (character) that every programmer must understand and recognize if he is a Cobol programmer.

Examples of broken Cobol and clarity coding that I was referring to are:

- Broken Cobol paragraph name: 110-DDUCT-COM.
- Clarity coding paragraph name: 110-DEDUCT-COMMISSION.
- Broken Cobol data names: TP-COV.
- Clarity Coding data names: TYPE-COVERAGE.

Plegge, I am sure, is being facetious in stating, "And as far as management reading programs goes, I have it on good authority that the last time a manager read a program was on May 17, 1973." Doesn't Plegge realize that perhaps the reason managers don't try to read programs is because their experience is that the programs are just not understandable?

That Plegge needs me or anyone to give him a definition of "clarity coding" reaffirms my contention that few in DP know what under-

standable coding should be. DP has become so accustomed to broken Cobol that it is accepted as good coding.

DP is in deep trouble if a project leader cannot look at a program and say whether it is easily understandable coding or not.

Jerry Sitner
President

Clarity Concept Systems
New York, N.Y.

Source Code Restriction

I read with some surprise the International Report [CW, July 4] from Munich, which reports a deteriorating situation in the relationship between IBM and the Share European Association (SEA) following the announcement by IBM on the restriction of source code.

While the SEA Executive Board is ever mindful of the need to react actively to any change of policy or direction by IBM or any other relevant resource supplier, where it is felt that the interests of its members are likely to be jeopardized, it is usually able to do this, within reason and effectively, without disrupting relationships.

Insofar as the source code restriction announcement is concerned, SEA issued an announcement to the European DP press that while it noted the anxieties being expressed by several of its member installations, it didn't intend to be prematurely alarmed, but would await developments and further information from its members before deciding upon any specific course of action.

In the meantime, the SEA Executive Board had sought and received an assurance from IBM that its intention was not to make its programs less usable.

Harry Hurst
Advisory Officer, Publicity
Share European Association
Wantage, Oxfordshire, England

LECHT ON SCIENCE/Charles P. Lecht

The AT&T Strike: Automate or Die

The recent strike by roughly 700,000 AT&T employees brings into sharper focus the impact of high technology upon labor. In my opinion, it is precisely the "automation question" that makes this particular strike unprecedented; for nowhere is it clearer than at AT&T that great operating efficiencies can be achieved through the replacement of vast numbers of people by machines.

AT&T has rightly discovered that the public really doesn't mind dealing directly with machines to perform simple, or even complex, transactions that were once handled exclusively by people. On the contrary, far from minding, the public has in some cases actually come to prefer such interactions, unencumbered as these are by capricious human judgment, or the disjunct interpolations of some misanthropic operator's mood swings. Apparently, we would sooner deal with the consequences of Lily Tomlin/Ernestine's "ringy dingies" from the relatively safe distance of a comedy skit than we would with the presumed real-life Exchange of Horrors upon whose performance her routines are modeled and that give them their point.

The experience of banks with automatic teller machines has been the same, probably for comparable reasons. The simple fact is that in situations where, as a consumer, somebody has business he would rather accomplish without having to deal with individuals he would not normally choose to cultivate, and who represent institutions with which he has contact only because he cannot choose not to, it is easy enough for that person to do without interpersonal relations, regardless of his basic position on the larger, cosmic question of automation.

This is the first in a two-part series on labor and automation.

So telephone operators, their supervisors, their bosses and the like are rapidly being replaced by talking, recording, even decision-making machines inserted into our communications networks where they (the forlorn and often unlamented human beings) used to be. As a consequence of this replacement, the breadth of services that can now be offered is increasing, improving and more reliable. Thus, in yet one more instance is it demonstrated that taking us failure-prone people out of the productivity equation crosses the last bridge to the manifold benefits available through automation. What to do with the people taken off is the problem.

Caught in a Dilemma

AT&T's management is caught in a dilemma in that if it behaved as though it knew precisely what it was doing, it would appear cruel; whereas if it pleaded ignorance, it would have to content itself with being perceived as stupid. After all, the events that led up to the current strike didn't happen overnight.

If we can believe what we read, it seems not to have occurred to labor that management is not engaged in a deliberate conspiracy to lose employees their jobs or to management that labor has not sworn allegiance to a plan whereby companies are to be stripped of their profits. To make either theory in the least bit plausible, one would have to believe that at least one of the parties was capable of masterminding and controlling the results of a plan that managed to be evil, pointless and hopelessly complicated all at the same time.

Not insignificantly, one would also have to believe that at least one party, or possibly both, were sufficiently aware of their objectives to find the profound misery resulting from a strike to be warranted.

It's not difficult to reject such improbable premises as these. Perhaps the most conclusive argument against them, however, is the most simple and practical one: it would be difficult enough to orchestrate such a Byzantine plot in technologically pacific times; in times of intense and, to a large degree, unpredictable technological change such as these, to do so would verge upon the impossible, if not actually define it.

Riptide of Technology

It runs counter to a deeply ingrained habit of perception in American industry to accept that when problems arise that disrupt the relationship between labor and management, the root cause of the breakdown may not lie, either wholly or even in part, with one party or the other.

Yet this is more and more frequently the case where progress and economy are imperatives generated by an inarguable and accelerating riptide of technology. No one who takes time to consider the matter with the seriousness it deserves can blame anyone else for the advance of technology, nor yet for the spirit of competition by which it, and the philosophical basis of our social system, are sustained.

But for us to continue to uphold the finest and most generous of American traditions, someone must step forward and take responsibility for correcting a condition of disorder at AT&T, even where the convenience of a guilty party is absent.

This is no time for our government to remove itself from the scene, whether it does so in the name of some ideology or of exhaustion of its moral/material resources, while the contesting parties struggle to work things out on their own.

Short of instituting its own welfare system, AT&T is powerless to solve the problems of its legion of new ex-employees. It cannot promise to rehire them. For that matter, it cannot even promise job security to many of its remaining white-collar personnel. The unions seem equally powerless to change things much; high-tech gear and competition go hand in hand.

Can we withstand accelerated striking in tandem with accelerated improvements in technology? Given the changes I see coming, our telephone industry could become so afflicted with labor disputes that the constant hiccup of interruptions, stoppages and strikes that determine the rhythm of life in Italy today could soon be commonplace.

In cases of union/management disputes over automation, where quantum improvements in price/performance ratios (some of which can obliterate entire job sectors) are possible, we would be wise indeed to avoid conflict by breaking the habit of finger pointing and coercive, backward-looking strike/antistrike actions in our search for solutions. It simply distracts us from addressing what is truly the key question: How are we to handle large numbers of people whose jobs are lost as we accrue the benefits of automation? In the telephone industry, the answer is obvious.

Lecht is president of Lecht Sciences, Inc., a New York-based think tank specializing in computer and communications technologies.

HUMAN CONNECTION/Jack Stone

Home Systems Offer DP Literacy Training

Time magazine in its now classic write-up on the "Machine of the Year," Jan. 3, 1983, was, in my opinion, way too quick to dismiss the real value of small home systems when it stated: "Another problem is that most personal computers end up costing considerably more than the ads imply. The \$100 model does not really do very much, and [even] the \$1,000 version requires additional payments [for add-on equipment]."

(By way of background for those of you who are inextricably enmeshed in the netherworld of MVS and similar creations, the home system referred to here is one selling for under \$100 for the processor plus keyboard and read-only memory Basic, the buyer supplying the TV monitor and tape cassette drive.)

The payoff from such machines comes not from their production capabilities, which they surely don't possess for that price level, but from their being start-up, yet effective, self-training devices for elementary

'The payoff from [home systems] comes from their being ... start-up, self-training devices for elementary literacy.'

literacy. And for this purpose, they are not only godsend, cutting instructional costs drastically, but throwaways that can be junked without emotional trauma or given away as birthday gifts when a trainee moves to a more serious model or gets bored with the computer idea altogether. After all, training these days is usually identified with at least a business-class personal computer priced upwards of \$1,000, well beyond the pocketbook of the ordinary person for a start-up machine.

Of course, I am fully aware that the home systems are mechanized primarily as game machines, but they nevertheless supply computing facilities that are just fine for beginners of any age. They provide new-

comers with a comfortable way of acquiring start-up skills because they are entertaining, interactive and involve hands-on operations.

Some Comparisons

Of course, in a performance comparison with IBM-grade personals, the home variety is overshadowed, but the differences are primarily in speed, capacity and operability and less so in function. Home models are slow, limited in data storage, awkward to operate and often have a fuzzy display — not really what we look for to get some decent work done. On the other hand, they are fully programmable and can demonstrate, using simple programs, all of the major processing functions of a computer, specifically, data entry and edit, storage access, sort and select, arithmetic and output.

Furthermore, within a few years, who's to say that a good deal of the processing power of the larger machines will not be available for some-

thing around \$100? Certainly, if recent history is any guide, prices of the personals are dropping extremely rapidly. Some recently reported statistics stated that the higher priced personals fell in price by an average of about 22% over the period of February to April of this year, and the home class fell in price by an average of about 60% since August 1982.

The point is that as instructional aids, home systems have what it takes to develop initial skills. Even more impressive than that, certain systems in this class have the capability to train people in intermediate-level subjects, such as automatic graphics, music and games.

Granted, these devices are far from perfect. Nevertheless, they have an important role to play in the grand scheme of training the mass population to ready them for the computer generation.

Letters to Stone should be addressed to him at Box 270, 1377 K St. N.W., Washington, D.C. 20007.

READER COMMENTARY/James Janossy†

Logical Verification Needed First in Testing

The article "Why Are Users Getting Untested Programs?" [CW, Aug. 1] caught my attention. I supervise programmers in a mainframe shop doing heavy Cullinet Software, Inc. IDMS and IBM CICS work in financial applications. We recently raised the eyebrows of higher management when we allocated as much time to testing the 117 modules making up the first phase of an on-line system as we allocated to the actual programming. But there is no way that we can accommodate the release of malfunctions into this particular production area; we may still fall short of the complete testing we feel we need.

Our problem is that one of the newer design methodologies, that of extreme modularization (fragmentation), has taken an on-line environment that would normally be characterized by about 22 program modules and expanded it to the large number indicated above, primarily because the designers were enamored of the faddish admonition to break apart functions into free-standing program modules. This complicates the practical side of testing because of the additional requirements to make simultaneous fixes in whole series of modules rather than in one place.

The main reason I raise a voice to

respond to the testing issue is that in discussing the testing approach with the designers, we ran into what I feel is a very odd attitude. We set up the programming staff and the project schedule so that we completed all the coding for the first phase of the work and then shifted assignments as we moved into first-phase testing. The idea was that new people looking at each module would be more impartial in testing the modules.

Becoming familiar with the specs included reading through the program to verify visually that the logic seemed appropriate before actually testing modules and interconnected

modules on-line. However, the systems designers felt that no visual review of the code should be done, that a whole series of on-line tests should be done, results noted, corrections made and then the whole series of tests repeated. This cycle was to repeat until all tests were successful.

The problem with this is that we can't spend years on the type of little patches and tweakings into which this leads. We are visually verifying code before starting tests and coming up with major rewrites and corrections that would have probably caused CICS toabend had we just begun to run this code raw. It's not the case that programmers made gross errors; in fact, the major problem is that the highly fragmented design approach places so much demand on module intercommunications with the CICS common area that this alone accounts for over 40% of the testing and correction work needed.

Two Components

Testing has two components: logical verification and execution verification. In the early days, only execution verification was much discussed.

Logical verification is possible with well-structured code for the same reason that well-structured code is easier to maintain: You can understand what it's doing by reading it. That's why we visually verify the logic of a program first. In fact, we really don't expect (nor do we actually find) major logic errors or omissions in the execution testing anymore. These are all caught in visual (logical) verification.

You don't get well-structured code "by letting programmers do their own thing" unless they are doing their own thing after having been exposed to and trained in logic structuring techniques. Our standard is Warnier diagramming, and it is used consistently on development work to produce the logical road maps on which code is based. We long ago developed models for basic functions and now use the Warnier representations of these as basic building blocks. We also long ago chucked the unusual symbology normally associated with these diagrams and instead label processes with plain English. It is still surprising to see the reaction of some folks when staff only three years in the field complete programs involving internal sorts, dynamic table loads, sequential updates and control break reporting (sometimes several of these in one program) on time, within budget and accurate after three compiles.

You need the logical verification before execution testing. Walk-throughs of code at the design stage, not the coding stage, help a great deal, but you have to have a good, consistent design documentation tool to do this. Otherwise, you're simply stuck with the obsolete approach of ramming every possible case through the code, and you will never have enough time or fingers for the holes in the dike.

Janossy is chief systems engineer at the city of Chicago data center.

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GETTING AHEAD IN DP / Donald J. Berardo

How to Fight Back Against Interruptions

"Got a minute?" How many times during the day does this question or one like it interrupt your train of thought or some task? Unless you are a corporate hermit, completely sealed off in a cubicle, or protected by a wall of invincible secretaries, chances are that your day consists of jerky alternations between work, interruptions and emergencies that disrupt your working rhythm and lower your productivity.

Interruptions, without doubt, are the worst time wasters going. Not only do interruptions take up valuable time themselves, but it takes time to get back on track once they are over.

If you are a manager, you must be accessible to a certain degree. Once your own efficiency begins to suffer, however, you must begin to alter your policies and control your availability.

If you are in some other highly visible position, you, too, must develop techniques that leave you time to be productive and uninterrupted.

There are various types of interrupters. Some of the most common are the telephone, work visitors (subordinates, peers, superiors and so on), friendly visitors, personal escapes and incoming mail.

Fighting Back

There are ways to fight back against interruptions and interrupters, and if you do it tactfully and amiably, you won't hurt anyone's feelings — you'll also get more work done and so will the people who waste their own time by interrupting you unnecessarily.

The most effective defense against interruptions is simply to say, "No." This isn't possible in all cases, of course, but it should be used much more often than it is.

Many people find it impossible to say no because they believe it damages a relationship or indicates unfriendliness or uncooperativeness. But such fears are often groundless. There are ways of saying no that will not offend any reasonable person. You can express interest in the person's problem or project, but cite how busy you are at the moment. Or you can explain that you have a critical job to work on and can't handle anything else right then and promise to get back to the person.

If you have a door, you must take steps to eliminate the "revolving door" syndrome, in which there seems to be an endless parade marching in and out of your office. Temper your open-door policy by keeping your door half closed for part of the day. An even more effective method is to close the door completely when there is work that must be finished without interruption.

In conjunction with the "cracked door" policy, you can advertise your office hours. Set certain times during which you will be available for conferences, and educate your people to visit only at those times.

You may want to schedule times for the people with whom you work most frequently. For instance, if you have an assistant who tends to barge

in whenever there's a problem or a decision to be made, arrange instead to meet at two or three specific times during the week in order to clear up all such issues.

During times of peak activity, you can ask your secretary or a co-worker to answer your phone and take a message for you. Likewise, you can instruct your secretary to screen all visitors during certain times.

You can also arrange to interrupt the interrupters. Tell your secretary to remind you that you have a meeting at 10:00 and wanted half an hour to prepare for it. Visitors in your office will get the message and excuse

themselves quickly.

You might try working outside of your office. Go somewhere — to your company library or an empty room — but let someone know where you can be found in case of an emergency. You don't want people thinking you are goofing off.

The hardest interruptions to resist are visits or calls from friends. When dealing with friends, be amiable but firm. Tell them you'll get back to them later, or ask them to meet you at lunch because you're busy at the moment.

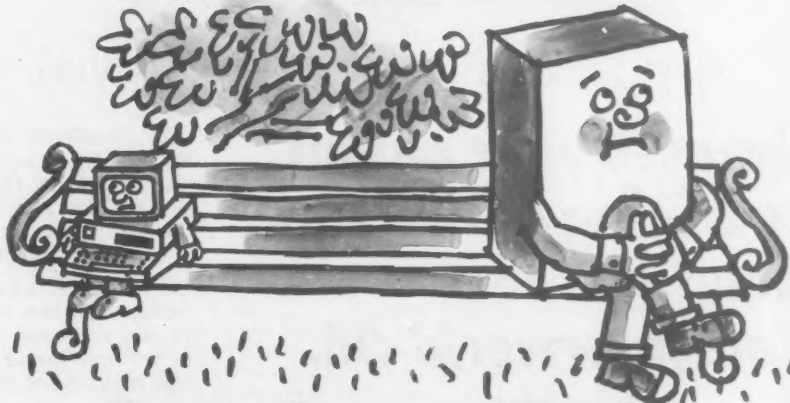
Finally, resist the temptation to open every piece of mail as soon as it

lands on your desk. Set aside time to go through your mail, or if you can't stand to have unopened mail on your desk, instruct your secretary to bring it in only at the time(s) you specify.

If you can schedule interruptions by using the techniques above, you will save both your own time and that of your employees and co-workers. And you will eliminate many of the petty annoyances and delays that eat away your day.

Berardo is a management counselor and career therapist. He is vice-president with the Meld Group in West Hartford, Conn., publishers of a monthly newsletter on management development.

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Info Center Requires Careful Planning

By Dennis Reilly
Special to CW

Although much literature is available on the information center concept, little has been written about how to justify, plan, install and operate it. The Decision Support Center at GTE Telenet Communications Corp. may provide guidance to others considering this concept.

The initiation phase determines the mission, objective and strategies for the information center. The mission is to serve as a source of tools to assist corporate personnel in addressing business problems and opportunities. The objective is to help them become self-sufficient enough to address their own computing needs. The strategy is to provide services through education, data software, hardware and assistance.

The next step is to determine the scope of the facility. Understand the strengths, limitations and interaction of both user-friendly software on mini- and mainframe computers and forms of computing available on microcomputers. The information

'Convincing senior management to fund the computing facility is the first major milestone ... having gained management commitment and funding, it is necessary to develop a philosophy to guide the initial setup and to ensure the consistent operation of the information center.'

center also offers a potential aid to the applications development group. The micro can be used to develop, modify and test production software that can then be uploaded to the host computer. The software on the mainframe can also be used to support a heuristic approach to prototype new production applications quickly.

Convincing senior management to fund the computing facility is the first major milestone. The information center concept should be explained with particular emphasis on eliminating the barriers that

have prevented business professionals from accessing corporate data. Support the argument with success stories of other organizations that have implemented end-user computing.

Having gained management commitment and funding, it is necessary to develop a philosophy to guide the initial setup and to ensure the consistent operation of the information center. Control over user activities should be nominal. The objective is to attract customers; too much control will drive them away. The staff should help the customer achieve his objective in every way possible short of doing his work for him.

Measure the activities of the information center. Keep plenty of statistics on staff and customer activities. Examples include trained users, active users, users by product, terminal usage, CPU usage, time reporting of staff, data extracts and customer-developed applications.

A charge-back system separates the serious from casual users. If the information center is doing its job, serious users will pay for the services. However, it is probably not prudent to start with this posture. A reasonable approach is to memo-bill departments for a period of time before activating a charge-back in earnest.

The startup of the computing facility should be deliberate. Have the staff develop the solution (just this once) in advance and then lead the customer through a process by which he arrives at the same solution. The customer will then indirectly tout the information center and its staff. Since this approach requires a large investment of staff time, start slowly, then gradually open the facility to more customers.

(Continued on Page 44)

Comshare Versions of System W Introduced for MVS, PC-DOS

ANN ARBOR, Mich. — Comshare, Inc. has announced two new versions of its System W distributed decision support system. The new versions are System W for IBM's MVS operating system with TSO; and Micro W for IBM's PC-DOS operating system on the IBM Personal Computer and Personal Computer XT. Micro W is also available on Digital Research, Inc.'s CP/M 86 operating system.

System W is an integrated data management package with capabilities for multi-dimensional reporting, modeling and analysis. Micro W for the Personal Computer offers modeling, reporting and "what if" analysis on two-dimensional spreadsheets. It has syntax compatibility and integrated communications with System W on the mainframe, a spokesman said.

The combination of System W on the mainframe and Micro W on the Personal Computer allows users to extract data from the mainframe and download it to the micro; develop and maintain libraries of applications on the mainframe for use on the

micro; develop models on the micro and upload them for mainframe processing; and transmit information from many micros to a single mainframe application.

Versions of System W are priced from \$55,000 to \$100,000, depending on options. Micro W costs \$995 and is sold only with the mainframe software. Comshare is located at 3001 S. State St., Ann Arbor, Mich. 48106.

'Caci/Job Manager' Out for Gcos

MECHANICSBURG, Pa. — Caci, Inc. Federal has announced Caci/Job Manager, an automated scheduling package for users of Honeywell, Inc.'s Gcos operating system.

The package was designed to relieve the technical staff of scheduling and running production jobs. The package also provides users a menu-driven, on-line method of scheduling production jobs.

Features include: job accounting information, report routing information and a

calendar function that permits regularly scheduled jobs to be prescheduled for selected dates or intervals. Once scheduled, jobs will automatically be prepared for execution. A job dependency scheme is used where a job cannot be spawned until another job has been completed. The package has a built-in security and password system.

The package costs \$12,900 for a perpetual license from 5010 Trindle Road, Mechanicsburg, Pa. 17055.

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Datapro had this to say about KOMAND: "If you are in the market for an efficient and flexible job accounting system for your OS or OS/VS system, you should take the time to evaluate KOMAND ... after all, these users judged it good enough to be placed in the highest cluster category for overall satisfaction."

In its 14 years of business, PACE has installed KOMAND in leading banks, corporations, governments and institutions worldwide. Some start with KOMAND/BASIC, which provides an inexpensive, fundamental job accounting package (with credit toward the larger KOMAND system as needs grow).

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Business Controls Unveils Release 3.0 of SB-5

ELMWOOD PARK, N.J. — Business Controls Corp. has announced Version 3.0 of its System Builders-5 Options (SB-5) automated Cobol ap-

plication software development system for use on Digital Equipment Corp. PDP-11, VAX-11, Decsystem-10 and Decsystem-20 computers.

Application software produced by SB-5 is portable across DEC operating systems including RSX-11M, RSTS/E, IAS, VMS, Tops-10 and Tops-20.

Enhancements to the product include:

- Support for all RMS file types.
- Support for up to 10 files within an application program.
- Support for all field

types permitted by the host system.

- Support for subroutine calls and menus.
- Expanded Help facilities.
- Activated RMS bucket capability.
- Decnet node specifications included in the data dictionary.
- Run-time support of multiple terminal types.
- Support of multiple re-

cord types per file.

- An increase in the number of report sort fields to 10.

The software costs \$12,000 on the PDP-11; \$14,000 on the VAX-11/730; \$20,000 on the VAX-11/750; \$23,000 on the VAX-11/780 and the Decsystem-2020; and \$32,000 on other Decsystem-10 and -20 series machines. The company is located at 507 Boulevard, Elmwood Park, N.J. 07407.

Language Options Out for Docu/Master

NORWALK, Conn. — TSI International has added several foreign language options and search enhancements to its Docu/Master document storage and retrieval system for IBM OS and DOS mainframes.

Release 2.2 reportedly allows a separate standard language for each terminal defined in the system. Search capabilities are said to give improved page displays, more powerful retrieval capabilities and more efficient range searching.

The basic system for DOS environments costs \$32,200 for a perpetual license and \$42,400 for perpetual use in OS environments. The firm

is located at 50 Washington St., Norwalk, Conn. 06854.

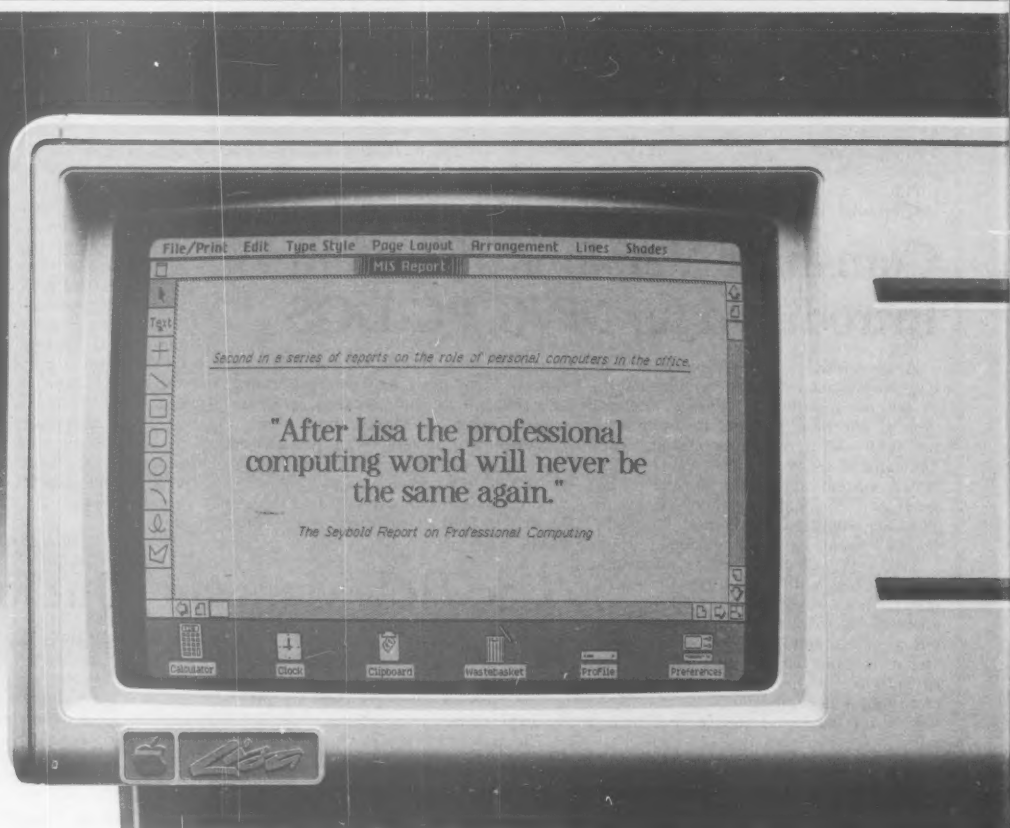
HP 3000 Gets Inventory, Billing Tool

MONTROSE, Calif. — A customer order package for Hewlett-Packard Co.'s HP 3000 has been announced by Mini-Computer Business Applications, Inc. (MCBA).

The Customer Order Processing (COP) package provides both single-pass customer invoicing and two-pass customer order entry with separate billing. COP accesses either by customer number or name and allows ordering of inventory either by item number or by description, MCBA said.

According to the vendor, the package can also handle blanket orders and consolidate orders for convenience; check availability and allocate inventory at entry time; and perform on-line credit checks.

Source code license prices range from \$4,500. Further information is available from MCBA at 2441 Honolulu Ave., Montrose, Calif. 91020.



Apple's new Lisa[®] is the world's most powerful personal computer.

Its 32-bit MC68000 microprocessor gives it the processing capability of a mid-range mainframe.

It also has one million bytes of internal memory. And, with a 5-Megabyte hard disk, more than 15 times the on-line mass storage of standard microcomputers.

Given these most imposing credentials, one could get the impression Lisa was designed solely to scare one's socks off.

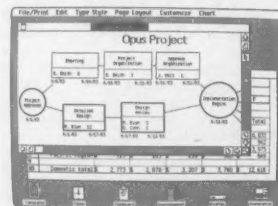
On the contrary.

What makes Lisa totally revolutionary is that, for the first time, all this phenomenal power is contained in a business computer you can learn to use in under 30 minutes.

200 years of hard work made it easy.

To tell Lisa what to do, all you have to do is point.

But achieving this simple concept required a totally new



Lisa's revolutionary software lets users perform several applications simultaneously, even "cut" and "paste" them together. The powerful project management program seen here is a Lisa exclusive.

approach to software and 200 person-years of development.

Lisa replaces complex computer commands with symbols

familiar to anyone who's ever worked at a desk.

Even someone who's never touched a computer before can learn Lisa in under half an hour. Versus the 20 hours or more required to unravel conventional PCs.

To information managers, that means dramatically reduced training time and increased productivity.

But people don't just learn faster on Lisa, they also work faster. Each of Lisa's powerful applications* use symbols and commands common to all.

So with little practice, users can move from LisaCalc to LisaGraph to LisaWrite without missing a beat. Or use them all at once, "cutting" information from one program and "pasting" it directly into another.

On-Line Payroll System Out for IBM System/38

SAN FRANCISCO — Consolidated Information Co. has announced a menu-driven on-line payroll system for the IBM System/38 minicomputer.

The Pay/38 system reportedly handles up to 99 forms of compensation, 99 voluntary deductions and all federal, state and local taxes.

Payroll calculation, update and reporting are accomplished by selecting options from menus displayed on a System/38 workstation screen. The system is written in RPG III and is priced at \$8,000.

Consolidated Information is at Suite 908, 177 Post St., San Francisco, Calif. 94108.

Release 3.1 of 'Accolade' Offered

CAMBRIDGE, Mass. — Multiplications, Inc. has announced Release 3.1 of Accolade, its application development system for use with IBM's CICS teleprocessing monitor.

The new release is said to include fully automated support of IBM DL/I data bases and the capability to initiate batch jobs and retrieve output under the control of the Accolade CICS transaction.

Additionally, the vendor

claimed, Release 3.1 has a report-browsing capability and the ability to inspect, modify, add or delete segments of a DL/I data base through Accolade's data base maintenance facilities.

Accolade is available on IBM OS/MVS, OS/VS1, DOS/VSE and DOS/MVT operating systems, the vendor said.

The license fee is \$39,000 for OS versions and \$28,000 for DOS versions from Mul-

tiplications, Inc. 1050 Massachusetts Ave., Cambridge, Mass. 02138.

Generators Target Burroughs

TALLAHASSEE, Fla. — EDP Systems, Inc. (ESI) has announced two nonprocedural, menu-driven productivity tools for use on Burroughs Corp. 1000 series small computers, B2700-4900 series medium-size systems and B5700-7900 series large systems.

Datapulse is a data base generator that reportedly allows each data element and structure to be described by narrative comments as well as logically.

Existing Burroughs DMSII data base definitions can be loaded automatically into the Datapulse metadata base, the company said.

Impulse is an interactive report-generation system said to include flexible data selection, sorting, multilevel subtotalling and grand-totaling based on multiple criteria.

Reports can be cataloged on a restricted or public-access level. Impulse data bases are also independent of DMSII naming conventions. ESI can be contacted through P.O. Box 5617, 1801 Gadsden St., Tallahassee, Fla. 32301.

Tool Aids Accounting For Educators

DARTMOUTH, N.S. — An accounting software package for small post-secondary educational institutions to run on Digital Equipment Corp.'s VAX system has been developed by Wycove Systems Ltd.

The package was developed in cooperation with the business office at Mount Saint Vincent University in Halifax, Nova Scotia, according to Wycove Systems.

The package handles general ledger, accounts payable, accounts receivable and purchase orders, the vendor said.

Most modules have separate sections for student accounts, the vendor said, adding that an additional security level has been built into the package.

The package costs \$45,000, the vendor said.

Further information is available from David F. Gray, Wycove Systems, through P.O. Box 499, Dartmouth, Nova Scotia B2Y 3Y8.

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Lisa's unique user interface enables programmers to develop Lisa-style programs with unaccustomed speed.

But that's not Lisa's only programming attraction.

The Lisa Workshop provides a powerful environment in which to develop COBOL applications. A full screen Lisa-like editor, code generator, and multiple windows make a

visible difference in development times.

Apple will supply all the documentation, instruction, and support a developer will require to integrate applications into the Lisa environment — no matter how sophisticated their information processing needs.

We support the whole family.

Apple now offers nationwide on-site service for all Apples in conjunction with RCA Service Company.

The hand operated mouse lets you use Lisa without touching the keyboard. All you have to do is point.

Plus a host of special services for Lisa — including a toll-free support line.

All of which you may never need.

A diagnostic program called LisaTest instantly isolates any defective board or component.

And the modular "plug-in" design of Lisa's five basic circuit boards and two disk drives allows parts to be replaced in seconds, with just one tool: Your fingers.

For the whole story, call our National Accounts Program at (800) 538-9696.

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Including Lisa, the computer that makes headlines.

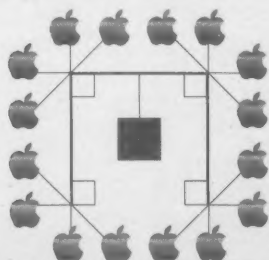


*With more programs on the way, Lisa's library now includes LisaCalc electronic spreadsheet, LisaList data base, LisaWrite word processing, LisaGraph business graphics, LisaDraw presentation graphics, LisaProject electronic project management and LisaTerminal data communications. For information regarding corporate purchases through our National Account Program, call (800) 538-9696. In Canada, call (800) 268-7796 or (800) 268-7637. Or write to Apple Computer Inc., MIS/EDP Marketing Dept., 20525 Mariani Ave., Cupertino, CA 95014.

©1983 Apple Computer Inc.

There's even a program — LisaProject — that lets you use the mouse to chart the progress of complex projects, automatically recalculating when deadlines or resources change.

On paper, Lisa is just as exceptional. With its dot matrix and daisy wheel printers, it produces printed materials just as you see them on the screen.



AppleNet, available soon, will let Lisas and other Apples share information, and costly peripherals.

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	\$ Amount	Total	13787.06	22071.22	20954.00	14210.25
		Percent of Regional Sales	28.7	39.4	52.6	43.0
Under 50000	Quantity	Total	4048	5131	None	1811
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Financial Aid Fits VAX-11s

TAMPA, Fla. — Collier-Jackson Corp. has announced that its CJ/Accounts Receivable package is available to users of Digital Equipment Corp.'s VAX-11 family of supermini-computers.

The package is an on-line, data base-oriented, menu-driven invoicing and accounts receivable program that provides control of customer account status for sales and collection analysis, the vendor said.

Features include open item or balance forwarding selection for each

account, automatic invoices, statements and age analysis, current and future periods, sales analysis by salesmen, customer and/or accounting periods and automatic data preparation for updating the general ledger, the vendor said.

The package accommodates multiple companies, divisions and departments, as well as single entities, the vendor said.

The package costs \$14,000 from Collier-Jackson at 5406 Hoover Blvd., Tampa, Fla. 33614.

Tominy's 'Data Base-Plus' Will Run on IBM's System/36

CINCINNATI — Tominy, Inc. announced that its Data Base-Plus portable applications software development package will operate on IBM's recently announced System/36.

The package consists of a series of software tools used to design and develop applications independent of specific hardware environments. Applications programs developed with Data Base-Plus reportedly use ad-

vanced management techniques, I/O interface facilities and a fourth-generation programming language.

The components of the package include a data base management system, screen handler, print handler, query/report writer and the Data Base-Plus programming language. When used on the System/36, Data Base-Plus also supports IBM-provided languages including Cobol, Fortran and assembler, the vendor said.

The package costs \$19,500 for a single development system and \$5,000 for the Data Base-Plus programming language. Tominy is located at Building One, 4221 Malsbary Road, Cincinnati, Ohio 45242.

Print-Log Function Out for DOS/VSE Users

MINNEAPOLIS — Davis, Thomas and Associates, Inc. has announced Dtdoc, an on-line print-log function for users of IBM's DOS/VSE operating system.

The package is said to eliminate the need for using the DOS/VSE console for reviewing hard-copy or console files. The utility allows DOS/VSE Release 3 users to view, scan and search the hard-copy file from any IBM 3270 CRT terminal connected to IBM's CICS/VS teleprocessing monitor, the vendor said.

Dtdoc provides a set of commands and a "Help" screen. The console log can be scanned in any direction by partition, job name or date.

Dtdoc does not require systems software modifications. It uses standard DOS/VSE or Power/VSE op-

tions. The package costs \$600, plus an annual \$75 maintenance fee after the first year. Davis, Thomas and Asso-

ciates is located at Suite 301, 8800 Highway 7, Minneapolis, Minn. 55426.

Release VI.4 Of 'DGA' Tool Available

LENEXA, Kan. — Data Products, Inc. has announced a release of its Data Generator Analyzer (DGA) programming productivity tool said to feature a full-function editor and IBM CICS map generator.

Release VI.4 is an enhancement of DGA, which runs under IBM's TSO and CICS in an IBM OS/MVS system to allow programmers to locate, view, reproduce, analyze, compare and modify data in an interactive environment.

Other features of the release include OS master console commands and JES queue access. DGA costs \$12,500 from Data Products, which can be reached through P.O. Box 14613, Lenexa, Kan. 66215.

'Versaplot' Modified For Use With Prime

SANTA CLARA, Calif. — Versatec has modified its Versaplot Random software for use with Prime Computer, Inc. computers running under the Primos operating system in single systems or network environments.

Versaplot Random reportedly produces any graphic representation on any Versatec electrostatic plotter or printer/plotter using a Versatec interactive processor.

The software package, which consists of Fortran IV source code, a set of command files to compile, assemble the source and build libraries and three manuals, costs \$3,500. Versatec is at 2710 Walsh Ave., Santa Clara, Calif. 95051.

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System/34, 36 Get DSS From De Faro Software

HERMOSA BEACH, Calif. — De Faro Software Systems, Inc. has announced a decision support system (DSS) for IBM's System/34 and System/36 minicomputers.

DSS-I is said to combine the features of an eight-dimensional modeling system, relational data base management system, account-driven transaction processor and on-line history analysis system.

The system also allows for the generation of business applications without programming. Reportedly, applications such as hierarchical budgeting and history management can be operated within one to four hours, and the system operator can be trained in one day.

DSS-I sells for \$8,000. De Faro Software Systems is located at Suite 4, 725 5th St., Hermosa Beach, Calif. 90254.

'Maps/GL' Out for VAX-11s

PALO ALTO, Calif. — Ross Systems, Inc. has announced general ledger software for use on the Digital Equipment Corp. VAX-11 supermini.

Called Maps/GL, the software features user-customizable transaction processing and reporting plus customer-controlled sys-

tem access. The system can be used for financial forecasting, budgeting, strategic business planning and "what if" financial/economic analyses.

Maps/GL is priced at \$22,500 to 30,000. Ross Systems is located at 1860 Embarcadero Road, Palo Alto, Calif. 94303.

Planning Seen Key to Info Center

(Continued from Page 39)

The early success of the end-user computing facility is largely dependent on the experience of the initial users. Select them carefully, understand their requirements and be sure the center can support them.

It is then time to get down to the real work of planning and organization. The staff should be skilled in interpersonal relations, training, problem analysis and patience. They should also be experienced in technical support and have a working knowledge of some end-user software products.

After selecting and installing the software, the staff must be trained in order to develop an adequate level of technical proficiency. To ensure adequate support, however, a limited number of products should be provided.

If formal education is offered, the staff will need time to develop classes. With the assistance and support of the corporate training department, the Decision Support Center developed an introduction to the information center and one product class before opening the facility for the initial users.

When operational, the information center may include the following activities:

- Consulting — helping users to define and solve their problems. Responsibilities include application and data analysis, product recommendations, debugging, design assistance and identifying training needs.
- Education — information center training should provide enough knowledge to get started in the use of products.
- Technical interface — the staff should pursue all problems regarding hardware, software, communications and data.
- Product evaluation — continuously ensure product offerings that support user requirements.
- Marketing — advertise and promote the information center. This technique both recognizes user accomplishments and markets the information center as the tool that made them possible.
- Resource management — monitor the effective utilization of information center people and dollars.

• Administration — this includes facilitating identification and passwords; creating and maintaining user profiles; monitoring data extracts; data recovery; main-

taining documentation; scheduling classes; maintaining education records; and gathering statistics on all activities.

Reilly is director of user services at GTE Telenet Communications.

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Datamate Offers Query System For NCR Users

TULSA, Okla. — Datamate Co. has announced the release of an English language query system for users of NCR Corp. computers.

Enquery reportedly allows non-technical users to create customized data reports. The product uses an internal data dictionary drawn from the computer's own file description and names chosen by the user, the vendor said. Once the dictionary is established, the user can create a report with a single command, using Enquery's free format. Commands are stored on a menu that allows the report to be reexecuted with three keystrokes, the vendor added.

Enquery is priced from \$4,000 from Datamate, located at Suite 101, 4135 S. 100th East Ave., Tulsa, Okla. 74145.

Firm to Market 'Realworld' Tool For RT-11, TSX

SHERMAN OAKS, Calif. — Glenn A. Barber & Associates, Inc. has announced it will market Real World Corp.'s Realworld business application package to users of Digital Equipment Corp.'s RT-11 or TSX operating systems using the Cobol-Plus programming language.

The Realworld package includes accounts receivable, order entry with inventory control, sales analysis, accounts payable, payroll and general ledger, the vendor said.

Any DEC LSI-11 or PDP-11-based system will support the applications. Operating system requirements are Version 4.0 of the RT-11 operating system and Cobol-Plus Version 4.0 or later. The minimum hardware required to take full advantage of the package in an RT-11 environment is: 64K bytes of memory, a 24-by-80-col. CRT terminal and a 132-col. printer. Under TSX-Plus, the minimum recommended memory requirement is 96K bytes, the vendor said.

Object code for the Realworld package costs \$750, the vendor said from Suite 304, 15010 Ventura Blvd., Sherman Oaks, Calif. 91403.

Entek Announces Engineering Tool

CINCINNATI — A structural modification program said to provide test and design engineers with a tool to evaluate analytically experimental or analytical model property definitions of structural systems has been introduced by Entek Scientific Corp.

Esmod, according to the vendor, allows manipulation of stiffness, mass and damping characteristics so designers can evaluate the effectiveness of each proposed solution prior to implementation into hardware.

The package operates on Hewlett-Packard Co. Series 200 computers, Models 16, 26 and 36.

The price of the package is \$6,000 from Entek Scientific, Suite 316, 4480 Lake Forest Drive, Cincinnati, Ohio 45242.

Designed for HP 3000

Manufacturing, Finance System Out

CUPERTINO, Calif. — A vertically integrated manufacturing and financial software system has been announced by Final Systems, Inc.

Courses Target IBM Micro Users

STONEHAM, Mass. — Ira H. Krakow and Associates, Inc. is offering an on-site training course for users of the IBM Personal Computer.

Topics covered by the course include: an executive introduction, an evaluation of automated spreadsheet programs for the Personal Computer, an introduction to the Lotus Development Corp. 1-2-3 package, introductory and advanced courses in Ba-

Manufacturing and Financial Answer is designed to run in the Hewlett-Packard Co. HP 3000 environment and is offered on either an

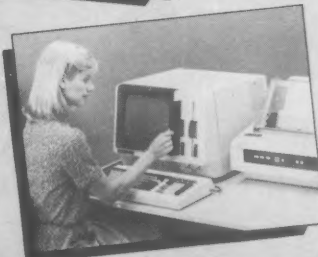
on-site or off-site basis. Tools include more than 250 individual reports; a user-oriented report writer; and an on-line, multiuser access of information, a spokesman said.

Subsystems provide information and control in the areas of inventory control, production bills of material, engineering bills of material, purchasing/receiving, work in process, shop floor control, capacity planning and master scheduling.

Each seminar lasts one day and costs \$100 per person with a minimum of 15 students. For more than 25 students, the course fee is \$75 per student per day from Ira H. Krakow and Associates at 12 Clearview Road, Stoneham, Mass. 02180.

The new package is supported by Final Systems' own data base management system and is available for \$80,000. Final Systems is located at Suite 5-F, 20430 Town Center Lane, Cupertino, Calif. 95014.

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Micro Notes

Multi Solutions, Inc. has announced the **S1 operating system** for Motorola, Inc. 68000; Zilog, Inc. Z80; and Intel Corp. 8080 and 8085 microprocessors. The system can support up to 256 processors simultaneously; can read and write files from a variety of other operating systems; supports multitasking and networking; provides full screen management, windowing and bit mapping; and includes extensive graphics support and utilities, a spokesman said. A preconfigured operating

system costs \$200 on the Intel 8080 and 8085, \$375 on the Zilog Z80 and \$950 on the Motorola 68000 from Multi Solutions at 660 Whitehead Road, Lawrenceville, N.J. 08648.

Wadsworth Electronic Publishing Co. has announced **Statpro**, a series of integrated statistics, graphics and data management programs for the Apple Computer, Inc. Apple II, Apple II+ and Apple IIe computers. The package is useful in business and economics, medi-

cal and clinical research, biology, social sciences, environmental studies, geology, engineering, agriculture and applied statistics, a spokesman said. The software costs \$1,995 from Wadsworth at Statler Office Building, 20 Park Plaza, Boston, Mass. 02116.

Cromemco, Inc. has introduced the **Statmaster** statistical analysis package for Cromemco systems using either Cromemco's Cdos or Cromix operating systems. Available on either 5-

in. or 8-in. diskettes, the software costs \$295. The firm also announced the availability of the **RPG-II** programming language on its microcomputer systems. The language has extensive file handling and data manipulation capabilities and operations for testing, comparing and selecting data; performing calculations; and numeric data entry, a spokesman said. RPG-II costs \$595. Both products are available from 280 Bernardo Ave., P.O. Box 7400, Mountain View, Calif. 94039.

An executive filing system/report writing program for the IBM Personal Computer and compatibles has been announced by Innovative Software, Inc. **Fast Facts** runs on both monochrome and color machines. The program requires two disk drives — either two floppies or one floppy and one hard disk with 128K random-access memory (RAM). The software costs \$195 from Suite 380, 9300 W. 110th St., Overland Park, Kan. 66210.

Canned Software Corp. has announced a Cobol source code generator that reportedly can be used on most microcomputers compatible with Digital Research, Inc.'s CP/M operating system.

Besides generating clean source code, the **Business Application Generator (BAG)** also self-generates an operator's guide, the company said, adding that training time ranges from two hours to two days, depending on the user's knowledge level.

BAG sells for \$1,995, Canned Software said from Route 1, Box 37, Pineville, Mo. 64856.

The Call Manager Division of Call Computers, Inc. has introduced the **Manager Data Base Management System** for the IBM Personal Computer, most IBM-compatible computers and all Digital Research, Inc. CP/M-based computers. The software costs \$195 from 1961 Old Middlefield Way, Mountain View, Calif. 94043.

State of the Art, Inc. has announced integrated business accounting applications software modules for multiuser/multi-tasking systems centered on such microcomputers as the Fortune Systems Corp. and Apple Computer, Inc. Lisa. Written in business Basic, the applications include general ledger, accounts receivable, accounts payable and budget and financial reporting. Priced from \$795 to \$895, the package is available from State of the Art at 3183-A Airway Ave., Costa Mesa, Calif. 92626.

Computer Analysis International has announced **Prefix**, an automated maintenance management package for users of Digital Research, Inc. CP/M or MP/M operating systems.

The package was designed to handle all types of equipment maintenance applications. A generalized work order contains information such as order numbers, work categories, equipment types, last date of maintenance, tasks to be performed and a series of blanks for reporting job completion, the vendor said.

Each work order is accompanied by a parts list that shows the part number, description and quantity for each type of part required for the job. Printing of work orders and parts lists can be triggered by a variety of methods, including elapsed time, meter reading, overdue status, associated equipment status or special requests, the vendor said.

The package costs \$1,995, Computer Analysis International said from 4035 Michaux St., Houston, Texas 77009.



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By Multiplexing Lines to Net Contel Improves Its Communications

WENTZVILLE, Mo. — A provider of telecommunications and information processing products and services has improved its own communications by multiplexing telephone lines to its time-sharing network.

Continental Telecom, Inc. (Contel) offers its services through five business groups. The largest of these, the Telephone Operations Group, provides telephone service and equipment to more than two million customers in 37 states and the Caribbean through its affiliated companies. The other four Contel firms provide business systems, information services, communications engineering and construction and network services.

Four years ago, Contel developed a time-sharing applications programming system for employees at its main data center here. With this system, employees could create their own programs or run one of the company's library programs

and access information on an as-required time-shared basis using a standard asynchronous 1,200 bit/sec terminal to call up one of the three data centers.

The system became so popular that the cost of long-distance access calls became excessive. In addition, as the users' applications became more sophisticated, faster and more reliable service was required, a Contel spokesman said.

As a solution to the problem, Contel decided to purchase data communications equipment that could link users together through a statistical multiplexer and reduce the amount of traffic on the phone lines. After evaluating the equipment available in the marketplace, Contel decided to purchase data communications equipment designed and manufactured by Digital Communications Associates, Inc. (DCA) of Norcross, Ga.

Using DCA 115 and 120 statistical multiplexers, Contel built a star network with

seven nodes — one each in Atlanta; Dallas; De Kalb, Ill.; Bakersfield, Calif.; Dulles Airport, Va.; Mound, Minn.; and here, according to James R. Jenkins, Contel vice-president of administration.

"This network now gave all of the time-share users the opportunity to make a long-distance call, get on the concentrator and ride a private line into the data center here, thereby staying off the dial-up facilities," Jenkins said.

With this network, users could call the nearest node in the network, and the multiplexer would switch them via a private line to the data center, freeing the dial-up facilities and releasing the central office telephone equipment for Contel customers.

This equipment solved the problem well, and Contel still uses the original network. By reducing the amount of phone lines used for business transactions, Contel reduced its expenses by 50%. As the number of automated business transactions grew, however, the company found that it needed to establish a full-function, multinode network to reduce the amount of paper required to establish phone service for its growing customer base.

As Jenkins explained, "During this three-year time when we were worrying about our toll problem and satisfying our customers, we also became more and more aware of each of our component agencies examining their own data communications needs. We knew that at some point we would have to make a significant monetary investment in data communications equipment to support the automation of our business functions."

After conducting an exhaustive study, Contel discovered that each new telephone customer required the company to generate numerous pieces of paper to establish telephone service. For example, different paper orders go to the white pages directory, the motor pool, the installation and repair person, the warehouse, the main computer center and engineering for cable pair assignment.

To reduce the expense of setting up

(Continued on Page 48)

Fusion Version 2.0 Connects IBM Micro to Microprocessors

LOS ANGELES — Network Research Corp. has released Version 2.0 of the company's Fusion software that links Microsoft, Inc.'s MS-DOS-based IBM Personal Computers to Intel Corp.'s 8086 microprocessor; Motorola, Inc.'s 68000 microprocessor; National Semiconductor Corp.'s 16032 microprocessor; and Digital Equipment Corp.'s PDP-11 and VAX-11 processors running Unix and Unix-like operating systems on a Xerox Corp. Ethernet local-area network. The Fusion Version 2.0 provides file transfer, virtual ter-

minal and network utility programs.

The file transfer program allows the user to move groups of files or complete directory hierarchies between IBM Personal Computer Unix systems with a single command, according to a Network Research spokesman.

The virtual terminal functions reportedly allow a user to log in remotely to another Unix system on the Ethernet. The network utilities are a collection of programs that provide network traffic monitoring and performance analysis, mail and print service.

For DEC PDP-11 and VAX-11 processors running Unix, the price for Fusion Version 2.0 is \$5,000, which includes an Ethernet controller card, a transceiver and transceiver cable. Software costs \$3,000, the vendor said.

More information is available from the vendor at Suite 200, 1964 Westwood Blvd., Los Angeles, Calif. 90025.

Modem Introduced On Single Card, Fits Bell 212A/103

MILPITAS, Calif. — Racal-Vadic, Inc. has introduced a modem on a single printed-circuit card said to be compatible with the Bell Laboratories 212A/103 modem.

The VA212PAR modem is said to be a direct-connect, originate, answer, full-duplex modem capable of up to 300 bit/sec asynchronous and 1,200 bit/sec synchronous or synchronous operation. The modem reportedly provides manual and automatic calling, as well as autoanswer capability.

Sixteen VA212PAR cards fit in all of the vendor's VA1600-series chassis, and the cards can be intermixed with other Racal-Vadic modems in the same chassis, according to the vendor.

A built-in automatic dialer using tone or pulse lines is standard in the modem, according to a vendor spokesman. Telephone numbers can be entered from the computer, and the dialer's memory stores the last telephone number dialed, the vendor said.

According to a vendor spokesman, a single-character command automatically redials the last telephone number called.

The modem's diagnostics include automatic self-test, analog and digital loop-back, remote digital loop-back and self-test.

Priced at \$695, the unit is available from Racal-Vadic at 1525 McCarthy Blvd., Milpitas, Calif. 95035.

Data Compression Unit Allows Modems to Double Throughput

ANN ARBOR, Mich. — Symplex Communications Corp. has introduced a data compression unit that reportedly allows any modem operating over a standard voice-grade phone line to double its throughput up to a limit of 19.2K bit/sec.

The company's Datamizer module relies on a Symplex-developed algorithm that results in error-free data compression ratios of at least 2:1, according to a company source.

Symplex's "SCC Tabling" algorithm allows the Datamizer to analyze any Ebcidic or Ascii data code set and convert it to a shortened subcode. The more frequently a given character is used in a data stream, the more its corresponding code set will be shortened, the source explained.

Datamizer also reportedly doubles as a statistical multiplexer and features dynamic bandwidth allocation.

Each of the unit's four channels can multiplex a different half- or full-duplex protocol at a different transmission speed, the vendor said.

Datamizer costs \$4,950 and is available from Symplex at Suite 17, 2002 Hogback Road, Ann Arbor, Mich. 48104.

Interface Unveiled As Plug-In Board

CINCINNATI — Intercomputer Communications Corp. (ICC) has announced its Intercom 200/201 telecommunications data interface/RS-232 interface available as a plug-in board for the IBM Personal Computer and Compaq Computer Corp.'s Portable Computer or as a stand-alone adapter for other applications.

The price of the board starts at \$140, the vendor said.

More information is available from ICC at 3195 Linwood Ave., Cincinnati, Ohio, 45208.

Contel Multiplexes Lines, Improves Communications

(Continued from Page 47)

these accounts, Contel developed the Distributed Customer Record Information System (Dcris) to automate the process.

Jenkins stated that the Dcris project "made it worth the effort to build the network we're installing now. We decided it would be expensive but cost-effective to automate and put in what amounts to a distributed information system, using computer centers in 14 different locations around the country with numerous business offices connected into each of these centers."

To allow its remote users to access the data centers, Contel organized its network around approximately 14 operating divisions. The company needed the data communications equipment primarily to perform multiplexing and switching to route users to the Honeywell, Inc. DPS-8/70 and DPS-6 mainframe computers in the data centers.

Mux Combination

In the current configuration, Contel uses a combination of DCA 115 and 120 statistical multiplexers, as well as DCA Model 355 network processors. Terminals connect to the system via either the statistical multiplexers or the network processors, which pass the data to a master 355 network processor that switches the user to the appropriate mainframe computer. When completed, approximately 7,000 users in the entire Contel network will contend for 100 host computers in 16 data centers.

Users in Simpsonville, S.C., are linked via a DCA 120 statistical multiplexer to the network processor in Sylva, N.C. Users in both cities can pass data to the 355 network processor in Pell City, Ala., which switches their data either to the Honeywell mainframe in Pell City, or gives them access to the nationwide network via a line to Atlanta.

Contel augmented its network with two special features: the Ansi X.25 Level 3 gateway interface and the Network Design System (NDS). The X.25 compatibility is crucial to the Contel network because it allows terminals manufactured by different vendors to communicate through the network to the host computers via a common protocol, X.25.

Users work on all different models of Ascii terminals, as well as on all major models of personal computers and minicomputers. To ensure compatibility among these disparate terminals and the host computers, Contel established a policy requiring all of its data communications equipment to feature the X.25 protocol.

The second special feature, NDS, allows Contel to reconfigure its network as often as needed or desired. Because the number of users and the volume of data traffic change constantly, the company needs this enhancement to keep the network growing with its business needs.

NDS offers Contel ultimate flexibility, especially since company network engineers can reconfigure the network themselves.

In the future, Contel plans to begin a program to allow the company

to monitor the performance of the digital switching centers remotely.

"Instead of an attendant at a switchboard to monitor problems, we hope to design our network to provide a pathway to pinpoint problems for us. Up until now, we've had humans on one end talking to a host computer or humans talking to humans. Now we're looking at machines using the network to talk with other machines," Jenkins said.

'Handshake' Links Micros

MILWAUKEE — Good(e) Business Systems has introduced an asynchronous telecommunications software package said to allow Fortune Systems Corp. microcomputers to communicate with other microcomputers, minicomputers or mainframes.

Handshake can reportedly be used for communications between systems connected by standard cabling as well as dial-up telephones. With an asynchronous modem (300 or 1,200 bit/sec) the entire Handshake program is reportedly contained on one flexible disk.

The user can custom design the characteristics of any particular requirement: transmission rate, parity, duplex, incoming line terminator or outgoing line terminator.

Additional features include a translator program to convert an Ascii file to a Fortune/Word file. The autodial feature allows automatic calling of a remote system, according to a vendor spokesman.

Priced at \$695, the package is available from Good(e) Business Systems at 9434 N. 107th St., Milwaukee, Wisc. 53225.

MIS MANAGERS: HOW TO MAKE ORDER OUT OF END-USER CHAOS.



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EXPRESS not only gives corporate departments access to each other's data, but to each other's analyses and conclusions as well.

While developing next year's financial plan, finance can call up marketing's sales projections. Operations has access to the strategic planner's estimates of future space and personnel needs. And top management can use the analyses and projections of every department to help meet corporate objectives.

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EXPRESS Integrates Personal Computers Into the Corporate DSS System.

With EXPRESS, your users' personal computers become part of the corporate decision support system.

With EXPRESS's micro features,

Express/DSS

Accessing IBM Environments

3R Protocol Converter Bows

WESTBORO, Mass. — 3R Computers, Inc. has introduced a protocol converter said to provide easy entry to IBM environments via a coaxial cluster controller connection for any Ascii terminal, personal computer, portable computer or other device.

Connecting to an IBM 3274/3276 cluster controller that supports IBM's protocol binary synchronous communications or Systems Network Architecture/Synchronous Data Link Control environments, the Avatar

PA1000 protocol converter is also said to permit access to asynchronous hosts and public information or time-sharing services, either locally or remotely.

Two standard RS-232C ports connect both the Ascii device and an asynchronous host, printer or modem for remote communications.

The price of the Avatar PA1000 is \$995. The unit is available from 3R Computers at 18 Lyman St., Westboro, Mass. 01581.

Terminal Emulates Burroughs

TEWKSBURY, Mass. — Visual Technology, Inc. has announced a video display terminal said to emulate the Burroughs Corp. TD830 terminal.

The Visual 383 is said to feature a tilt-and-swivel display and a 14-in. nonglare screen. Power-on diagnostics, line monitor mode, printer support, user-definable keyboard including eight programmable function keys and standard Burroughs Poll/Select protocol are other features.

Also standard are Local Forms

Storage, English configuration menus, selectable TDI/RS-232 interface and configurable synchronous/asynchronous RS-232 interface. The unit costs \$1,695 from Visual Technology at 540 Main St., Tewksbury, Mass. 01876.

Lexidata Offers Price Reductions For Imageview

BOSTON — Lexidata Corp. has announced a price reduction on two of its Imageview image processing and display systems.

Imageview, an imaging subsystem, reportedly performs nearly 100 imaging and graphics functions locally in the display processor.

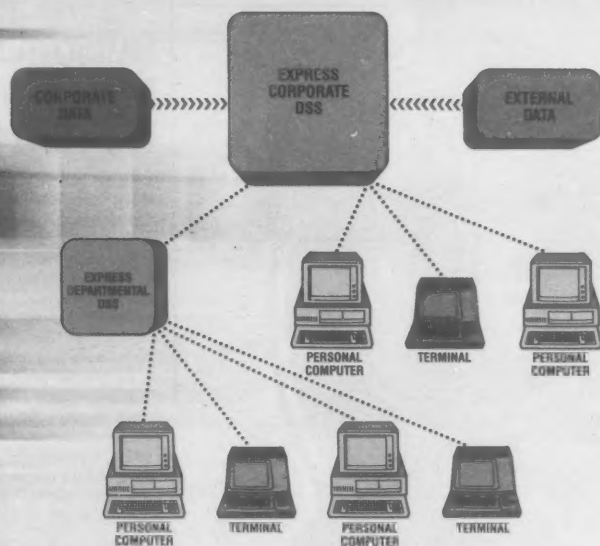
Imageview features a method of image data management called the Virtual Image system, said to speed application software development by simplifying the user interface to the display processor.

The first configuration of the Virtual Image system with a reduced price features a 640 by 512 noninterlaced display, 12 image planes, four overlays and a color and grey-scale lookup table capable of displaying 4,096 simultaneous colors from a palette of 16.7 million, according to a vendor spokesman. The price for this configuration has been reduced 25% to \$19,950.

The second configuration features a 1,280 by 1,024 interlaced display, eight image planes and a color and grey-scale lookup table capable of displaying 256 colors simultaneously. This configuration has been reduced 17% to \$24,950.

More information is available from Lexidata, located at 755 Middlesex Tnpk., Billerica, Mass. 01865.

EXPRESS — THE DSS INTEGRATOR.



users can download data to their P.C.'s from the EXPRESS corporate data base—budgets, income statements, syndicated marketing data, any external data on file. Use micro packages such as Visicalc® and Lotus's 1-2-3® to manipulate the data. Send back the results to the corporate data base to be shared by other users. Use EXPRESS's advanced capabilities to do further analysis or modeling.

Your users can do all this, while EXPRESS coordinates, manages, and ties together all that data for you.

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data sharing, and security among all your users, whether they're using your Information Center, their own P.C.'s, or a combination of both. And your staff will use EXPRESS's powerful, 4th-generation programming language to deliver complex systems in days, not months.

EXPRESS Has a Proven Track Record. We've been in the DSS business for 12 years and have success stories in hundreds of top companies world wide. Companies in a variety of businesses—heavy manufacturing, consumer packaged goods, insurance—including Avon, Firestone, G.D. Searle and Bell (Canada).

And we offer our clients a lot more than just software. We have comprehensive training programs and user documentation to get you up to speed quickly. On-going technical support to answer any questions. And the best,

most experienced DSS application and implementation experts in the business.

Find Out What EXPRESS Can Do For You. We think EXPRESS may just turn out to be one of the best business decisions you've ever made. And we'd like an opportunity to prove it.

Give us a call today and we'll tell you more about this remarkable DSS package and how it can clear up your integration headaches. We can arrange a hands-on demonstration and show you how we've worked with companies like yours.

Call us at our corporate office at (617) 890-1100. Or write EXPRESS Product Manager, Management Decision Systems, Inc., 200 Fifth Avenue, Waltham, Massachusetts 02254.

Stat Multiplexer From Timeplex Gets Option

WOODCLIFF LAKE, N.J. — Timeplex, Inc. has announced its Microplexer statistical multiplexer which can now operate at different send/receive speeds.

The split-speed option can be added to the firm's standard four-port expansion modules by replacing universal synchronous/asynchronous receiver/transmitter chips with a small daughter board. Each board modifies two user ports, the vendor said.

The split-speed option allows the user to program either the transmit or receive speed of any port at any standard speed from 50 to 9,600 bit/sec, the vendor said.

The two-channel daughter board costs \$150, according to the vendor.

More information is available from Timeplex, which is located at 400 Chestnut Ridge Road, Woodcliff Lake, N.J. 07675.

Management
Decision Systems, Inc.



Multimux Series Features Multiple-Channel Versions

NEW BRIGHTON, Minn. — Multi-Tech Systems, Inc. has announced a line of statistical multiplexers that come in one-, two-, four- and eight-channel versions.

The company's Multimux series of products reputedly supports both point-to-point and multipoint communications and accepts asynchronous data up to 9,600 bit/sec for transmission over a synchronous full-duplex link.

In multipoint networks, the multiplexers provide a poll-addressing capability for dumb terminal sites, according to a Multi-Tech source.

Capable of inputting up to 19.2K bit/sec, the Multimux line reportedly permits buffers to be allocated dynamically and operating speeds to be selected automatically. The units also come with seven system status indicators and boast local, remote and self-test diagnostic capabilities.

In a four-channel version, the multiplexers cost \$1,295, compared to \$2,095 for an eight-channel configuration. Prices vary with the number of channels, according to the Multi-Tech source at 82 Second Ave. S.E., New Brighton, Minn. 55112.

Net Interface Server Debuts

SUNNYVALE, Calif. — The Destek Group has introduced a standalone network interface server for its Desnet local-area network.

The Network Interface Server reportedly connects microcomputers, peripherals, controllers or instruments through an RS-232, RS-422, parallel or IEEE 488 port to Desnet. Virtually any device with one of these standard ports may be connected to the network, according to the vendor.

The server is reportedly self-contained, including its own enclosure, power supply and control firmware in read-only memory. The firmware allows simple software interface to the server, according to the vendor spokesman.

Priced at \$697, the server is avail-

able from the Destek Group at 830 E. Evelyn Ave., Sunnyvale, Calif. 94086.

Gandalf Modem Fits in Pocket

WHEELING, Ill. — Gandalf Data, Inc. has introduced the second modem in its miniaturized modem series for use on dedicated four-wire unloaded metallic circuits and local-area data service circuits.

The MLDS 122 is a pocket-sized, autoequalized 9,600 bit/sec asynchronous modem said to provide high-speed communications within a 4-mile range. The modem is said to plug directly into data terminal equipment and is supplied with either a male or female connector. It operates point-to-point from 50 bit/sec to 9,600 bit/sec.

Priced at \$95, the modem is available from Gandalf Data at 1019 S. Noel, Wheeling, Ill. 60090.

Integral Modem Joins Functions For IBM Micro

BEDFORD, Mass. — IDE Associates, Inc. has introduced a 300 to 1,200 bit/sec integral modem for use on the IBM Personal Computer.

The Ideacomm 1200 is said to combine the functions of an inboard asynchronous card with an outboard modem in one plug-in unit. The unit includes an RS-232C interface that can be used as a serial port; and it has an additional plug for voice communications when data communications is not in use, according to the vendor.

The Ideacomm 1200 costs \$545. More information is available from IDE Associates, 7 Oak Park Drive, Bedford, Mass. 01730.

Control Option Out for Modem

WALTHAM, Mass. — A data communications equipment supplier has added a synchronous/asynchronous control option to its existing 2,400 bit/sec full-duplex modem.

Concord Data Systems, Inc.'s front-panel control feature is said to spare users the inconvenience of having to reconfigure the firm's Model 224 modem with straps situated inside the product's housing.

Until now, the 224 cost \$995. The addition of the control option has raised the modem's price to \$1,095, Concord Data Systems said from 303 Bear Hill Road, Waltham, Mass. 02154.



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*Universal Operating System is a trademark of SofTech Microsystems Inc., UCSD p-System is a trademark of the Regents of the University of California



Paradyne's Analysis 5500 Series

Paradyne Offers Analysis System, Modem Series

LARGO, Fla. — Paradyne Corp. has introduced a family of communications products, including an improved series of signal processing modems that offer reduced size and power requirements and an advanced network system said to eliminate remote site changes.

The modems in the MPX series of 2,400, 4,800 and 9,600 bit/sec synchronous units employ a custom-designed large-scale integrated chip set constructed with Nmos and Cmos technology. The MPX modems are available for \$950, \$2,000 and \$3,400, respectively.

Paradyne also announced the Analysis 5500 advanced network management system. The system is said to allow software-generated strapping options to be downline loaded and permit a user to review the strapping of any modem in the network at the Analysis console.

The Analysis 5500 costs between \$20,000 and \$55,000 from Paradyne, P.O. Box 1347, 8550 Ulmerton Road, Largo, Fla. 33540.

Services Give VAX-11 Users IP/TCP Access

PALO ALTO, Calif. — The Wollongong Group has introduced installation and support services that will allow users of the Digital Equipment Corp. VAX-11 superminicomputer to access the Internet Protocol/Transmission Control Protocol (IP/TCP).

VAX-11 users running Eunice, the VMS/Bell Laboratories Unix meta-processor, will be able to access IP/TCP.

IP/TCP is priced at \$15,000 for the first installation and \$5,000 each for copies. More information is available from The Wollongong Group, 1135A San Antonio Road, Palo Alto, Calif. 94303.



Features 16K Bytes of Memory Portable Printing Terminal Out

PARAMUS, N.J. — Computer Transceiver Systems, Inc. has introduced its Execuport 443 portable impact printing terminal, which it

claims has a memory capacity of 16,384 characters.

The Execuport 443 features 16K bytes of main memory with edit

functions, a battery backup option and is said to be compatible with Telex I and Telex II networks.

The terminal prints at speeds up to 80 char./sec at 15 char./in. Communications speed ranges from 110 bit/sec to 1,200 bit/sec, according to a vendor spokeswoman. To avoid data loss at 450, 600 and 1,200 bit/sec, a choice of data pacing is provided utilizing break, on/off or discrete signal on an RS-232 connector.

Edit functions reportedly permit rapid data manipulation in memory.

Priced at \$1,895, the terminal is available from Computer Transceiver Systems, Box 15, E. 66 Midland Ave., Paramus, N.J. 07652.

Service Contracts Available

IRVINE, Calif. — CIE Terminals, Inc. has announced the availability of service contracts for its line of CI-300/600 variable speed matrix line printers.

Three service contracts are being offered, according to a CIE spokesman. Installation and annual on-site service is available for \$1,080 per year; installation and 90-day on-site

service costs \$450; and installation, 90-day on-site service and the printer's \$250 pedestal costs \$600. The price for installation alone is \$300.

Prices are for the CI-300 printer only; prices for the CI-600 will be announced at a later date. More information is available from CIE Terminals, 2505 McCabe Way, Irvine, Calif. 92714.

Pitch Points for Net/Alert salesmen,
from the Avant-Garde Marketing Department.

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The NET/ALERT® Alert

August 1983

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4. Host interface adaptor to transfer Net/Alert data base to the host processor	\$18,000
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6. Additional color CRT	\$14,000

Software license fee is \$200 per month plus \$2 per month per line monitored.

REMEMBER:

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- Net/Alert color brochure
- Avant-Garde's Primer on Network Management
- Case Studies, reprinted from customer evaluations of Net/Alert Systems
- examples of Net/Alert real-time color graphic status and performance displays, performance graphs, including application analyses
- comparison graphs, including application analyses
- Avant-Garde's product brochure, including Net/Switch and Tempo.

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The first is its fully integrated software. Yes, fully integrated. Its CapsuleWare™ software programs are contained within storage capsules that plug interchangeably into the computer.

No other microcomputer offers the degree of software integration afforded by the Gavilan shared data format of CapsuleWare.

The complete set of CapsuleWare programs includes CapsuleWord™ word processing, CapsuleCalc™ calculation & analysis, CapsuleOffice™ portable secretary, CapsuleComm™ communications and CapsuleForm™ forms processing.

Secondly, the Gavilan's primary user interface is not the keyboard, but instead, a built-in pressure-sensitive touch panel that not only selects, but executes, commands. With the full capabilities of a mouse, this simple "point

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Bell Labs' Version of

The **UNIX** Story

For Unix users, the years of "Here's your tape — don't call us" are over. The Bell system announced in January software support for the System V version of its fast-spreading operating system. In May, four microprocessor companies agreed to develop System V for their individual chips. In June, Western Electric initiated systems training courses. Can Unix thrive now in the commercial world with Bell's support as it did in academia with Bell's inattention? Can this "elegant, powerful, simple" operating system become the de facto standard in the 16- and 32-bit mini and microcomputer markets? Will IBM's Personal Computer ever run Bell's Unix? Features Editor George Harrar asked these questions of Larry Crume, department head, Unix Systems Planning, at Bell Laboratories in Murray Hill, N.J. The following interview explores the ascendance of Unix, the operating system created 14 years ago by Ken Thompson and Dennis Ritchie.



CW Photo by G. Harrar

August 22, 1983

IN DEPTH

What distinguishes Unix from other operating systems?

The single most important thing is the ability to port it to different computing systems.

In the past, operating systems tended to be very much married to the hardware. VMS, MVS — they were built with the hardware, whereas the Unix system was built as a portable

system. It started out with hardware, but then it quickly moved to where we did research on portability across hardware architectures.

Portability has two dimensions to me, and typically

we don't talk about them. There's portability of the operating system across different hardware, and there's also portability of applications, which is very important. Customers absolutely

need to be able to have an application run on their micros, their minis and their mainframes. And if you can get that portability across systems, you gain a form of productivity that is very important to our industry.

As such a portable operating system from micro to mainframe, does Unix have any competition?

Sure, there are alternatives in each area, but I don't know of any other operating system that spans the whole range.

What machines can currently run Unix?

The IBM 370, 3033, Series/1; Amdahl; Sperry 1100s; DEC VAX and PDP; Data General; Prime; Hewlett-Packard; Perkin-Elmer; Harris — plus development is under way for many micro-based ports for Intel, Zilog, National Semiconductor and Motorola chips.

What is your personal involvement with Unix?

I have had the responsibility of planning what happens to the Unix system and producing the releases for the Bell system. In particular, I interface very heavily with the customers. Western Electric is in the process of setting up a marketing organization, and in the meantime I help fill that role. I have the responsibility of taking customer needs and translating them into specific requirements. Then I have the responsibility of producing systems that meet those needs.

Words such as simplicity, elegance and power are often applied to the Unix system. How do these words relate to actual features?

Abuser Friendly Report Processor For IBM/38?

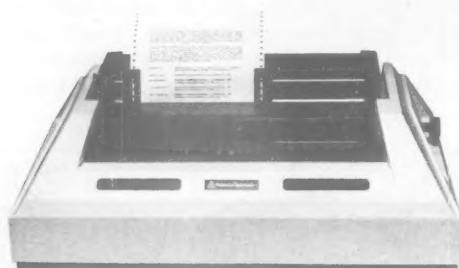
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But the built-in feature that's got everybody talking is Rapid/Scribe's speed... over 500 characters per second at 10 Pitch in the high speed draft mode; and 110 cps in the proportionally spaced, Dual Pass Correspondence Mode.

The accompanying chart summarizes the speeds. Notice that at 10 Pitch and 80 Columns, Speed is 275 Lines Per Minute.

Equally exciting are the impressive array of features that have become the Anadex hallmarks...friction and tractor feed, sophisticated communications capability, emulation packages, character font downloading, alternate character fonts, bar codes, and of course, a reputation for reliability.

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12 Pitch	540 cps
Enhanced	
Proportional	275 cps
10 Pitch	250 cps
12 Pitch	300 cps
Condensed	
15 Pitch	375 cps
16.4 Pitch	410 cps
Dual Pass Correspondence Quality	
Proportional	110 cps
10 Pitch	100 cps
12 Pitch	120 cps
10 Pitch Printing Speed (lines/minute)	
40 Columns	430 lpm
80 Columns	275 lpm
132 Columns	180 lpm

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UNIX STORY

IN DEPTH

The Unix system has the capabilities of most of the operating systems of most large mainframes, where the whole operating system business got started over the past 20 years. And in particular, those capabilities are accessible very much more easily than in the mainframe environment. For instance, the ability to run processes to do several different functions. In the world of the Unix system user, that's very easy to set up. The whole user interface is simple.

Where does Unix get its power?

Not from any new or novel concept, but from a careful set of choices of what to include, and more importantly, what not to include.

In terms of the system's development, did Ken Thompson, Dennis Ritchie and the others set out purposely to create this kind of operating system, or did they stumble onto it?

Thompson had worked on an operating system that has added a lot of technology to our business, namely Multics. Multics has had a tremendous number of spinoffs in the industry. And when they were doing Multics here at Bell Labs in combination with the Project MAC at MIT and General Electric, there were a number of issues associated with the project that made the design overly complicated. So in his job as a researcher at Bell Labs, Thompson had the opportunity when the Multics project was cancelled to address the issues as he saw them.

From a research point of view, he has freedom to do basic research into computer science that people who are tied up in building products don't have. So he had the freedom to explore and try different ways of making that interface simple.

They weren't attempting to develop a portable system?

If you look back, you'll find a lot of complex things happening. We had a batch world at that time. You'll see Multics, and IBM working on TSS, and you'll see something at MIT, I believe it was called CTSS. Thompson was sitting in the middle of this operating system business, which was really starting to pick up steam in the late '60s. He had an opportunity to capitalize on the Multics research. It's not clear that he foresaw where this was going. But he definitely had the environment to do that research.

What are the drawbacks of Unix, coming from someone committed to the system?

I see some drawbacks, and I'm presenting them to you as things we're going to solve. The Unix system has been developed for high-technology professionals. We have built the Unix system, we have built applications to meet the needs of Bell system users. It's not a significant prob-

'We have a history of building computing systems that interface to a number of customers. A good example is the telephone system. It's very simple to use. The Unix system will move that way very rapidly.'

lem to move it to meet the needs of other customers, but the Unix system continues to get tagged that it

doesn't meet the needs of other consumer groups. But remember who we were building it for — highly

technical people with specialized training.

We've gotten tagged, but I think we can move through that very quickly, because we also have a history of building computing systems that interface to a number of customers.

A good example is the telephone system. It's very simple to use. The Unix system will move that way very rapidly.

I think the Unix system was used

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IN DEPTH

for some things that it wasn't positioned to do. Internally, we have done some things that haven't happened outside yet. People are still going in different directions, claiming this Unix system is better than that. I think we've more or less stopped that argument internally.

The first couple of uses within Bell were for programmers in Bell Labs, for writing software development systems. Another was our legal department, which used it for document preparation. Those are places with people who can be easily trained to use the Unix system.

We have some work to do to explain to people how it can be used. When you sit down at a Unix system, you have a wide array of dials and switches available to you. How do you put them together to achieve results? We have some work to do teaching people all the ways the features of the system can be put together for their best advantage.

You step up to a Unix system right now and you can get this program that will search through a file to find information and you can tell it what to find. You've got the file system, you've got editors, you have a program which we call "Awk," which is

Unix Pricing, Installations

As of May, the system has been licensed to 1,200 educational users (3,600 installations), 600 commercial users (1,000 installations) and 300 government users (600 installations).

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a report generator. With those few things, you can step up and build a very simple data base management system that will carry a number of users a long distance.

We have a responsibility to teach people how to use what they have in their hands. We have continued to expand its use within the Bell system. In Bell Labs, we're still finding ways people have capitalized on the use of the Unix system, which we have to go out and teach people. System III and System V represent a pulling together of what has been going on in various locations within the Bell system. Writer's Workbench software, which was just announced in Toronto, is a good example.

Is the traditional tie to the C language hurting Unix now? Does Unix need to break away from it?

We believe the tie of C to the Unix system gives it its power. C is a simple language, it's a very powerful language. And married with Unix gives it a lot of power for the portability from processor to processor.

C is one of the few languages that run on so many processors. And that again is tied to some research that was going on here at Bell Laboratories having to do with portable compilers that Dennis Ritchie and Steve Johnson did work on.

It's that connection of C and the Unix system that gives it power. In fact, if you go out in the industry, you don't have a Unix system unless you have a C compiler. That's a symbiotic relationship that's very important.

But are there enough C programmers out there in order to allow Unix to get into many more environments?

The whole language issue is an interesting one as the Unix system moves into the commercial world, which traditionally has been tied to Cobol and Fortran. The whole movement to have Cobol compilers, even from our side to include these as part of the product, is there. If you attend the conferences, you'll see a number of Cobol compilers and interpreters showing up that run with the Unix system.

I think a lot of the problem with language stems from whom you're talking to. For instance, we find CAD/CAM people inside of a company going to C — they're moving away from the languages like Fortran.

If you go out into the mainframe commercial world, those are Cobol shops. Those needs have to be met. This is an area the Unix operating system is just starting to move into.

What specific needs are you referring to, and how can Unix fulfill them?

For commercial applications, not only Cobol, but also data bases, audit trails, enhanced security, forms management and so on.

Doesn't the difficulty of working in the C language put off programmers a little bit? Are there really enough C programmers?

The largest number of users of the Unix system probably in the world are internal to the Bell system. They use it in environments where people know nothing about the Unix system and nothing about C. They're strictly in an applications environment. C is not necessarily good or bad. It's there and it's usable.

The Unix system really wasn't developed as an operating system and a piece of hardware you get someplace. It was developed and integrated to meet some programmers' needs.

Thompson is a programmer. In fact, you've probably seen many times the statement that Unix was developed by programmers for programmers. The integration of the operating system and the capabilities — that distinction was not really one we tended to make clear.

When you move into the commercial world, people see there's an operating system and hardware, therefore they expect language utilities that they can go write their applications with.

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IN DEPTH

That's just happening to the Unix world, and the micro world is driving it that way at a good clip.

So the spread of micros is forcing Unix to be more user

friendly as it leaves the hands of programmers and university hackers?

The micros make the Unix system accessible to new groups of users who have

new needs.

Is Unix developed to the point yet where it can flourish in a commercial environment that doesn't have the Unix "hacker" or "wiz-

ard" in residence to sort out problems, such as you would find in a university setting?

Within the Bell System, we have installed hundreds

of operations support systems running the Unix system. Comparable systems for the office environment are starting to appear.

How is Unix geared for office automation applications?

The Unix system in OA grew out of it being used internally for office automation: to handle dialing out, for instance, to manage calls and other secretarial-type functions. Outside, the explosion is occurring of trying to bring more intelligence to the desktop. The Unix system has nice properties to support that.

We need to create OA systems that are as simple as driving a car. Trying to reduce the training costs of people is an important dimension. Writer's Workbench software can be used in the OA area.

What particular features support Unix's role in the office?

Sophisticated text processing tools, simple interuser communications, the ability to work with a wide range of terminals and to connect to the whole range of corporate data bases.

Some vendors of office automation equipment say Unix in its current version isn't ready for the office environment.

When you move to the outside world, people need efficient record and file locking. Say several secretaries are controlling a calendar. You need to protect them from each other. File sharing is accepted and manageable in some time-sharing environments.

However, when it comes down to end users, this shared data could be a problem, with people updating things inappropriately, for instance. These types of security features are needed and are being worked on now.

When Unix was developed, was it responding to any particular need at Bell Labs?

There were some interesting things going on. Remember, we had just come off this large Multics project where there was, more than anything, probably some bad feeling in the Bell system about doing operating systems. So if you ask were

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IN DEPTH

Thompson and Ritchie encouraged to go into operating systems research and to solve needs within the Bell system, I don't believe so. But I suspect if you talk with them, you would find that yes, there were some needs they saw that they were trying to solve for themselves as programmers.

You'll hear the mention of something called V6 and V7 and 32V, you'll hear some things called PWB System III and System V. Those are strains of the Unix system that I think it's important the user community understand. The people in the research area of Bell Labs tend to do basic research and understand what happens to a system. For instance, when we went from V6 to V7, we were not well received by all users. That was a research step where we were looking at new file systems and extensions to the file systems, and it was not an upward-compatible step. In fact, it gave us some bad name.

But I don't believe research should build products where they should be worried about those kinds of things. If they're hampered by those restrictions, sometimes they don't find out what things they need to do to a system to meet a customer's needs. The PWB System III and System V strain has come out of people who were responsible for building products to meet needs. And in particular, we were building those products to meet the needs of the operations support and program development projects inside Bell Labs.

So if meeting consumers' needs now in these later systems is uppermost in your minds, does that mean that the role of the originators, such as Thompson and Ritchie, has changed? They did not attend the January announcement. Are they still actively conducting research on Unix?

They are still involved in research associated with computing and use the Unix system as a basis for much of that research. Recently, articles have also been written about Thompson and a chess machine, but his research goes beyond chess into the area of specific hardware/software combinations to solve complex problems. Although neither attended the January announcement, both were at the Usenix conference in Toronto this past July.

In January, Bell announced it was locking the kernel. The idea is to encourage software developers to write Unix-based applications. Is the lack of applications software right now the major obstacle to wider acceptance of Unix?

Two issues concern us. One is locking the kernel. Locking the kernel is being misunderstood. I believe what should be pushed and what should be told to the industry is that we will evolve the kernel in an upward-compatible manner for our cus-

tomers. I don't believe you can lock something and say, "That's it, can't change it." We'll evolve the kernel out in the public view. We are now part of the standards groups in Unique and Unicom. We are on the IEEE Operating System Interface Task Force.

Applications is the second issue you brought up. There's something about the Unix system users' cult that doesn't come through when people talk about it. I believe we have an

education process to do. If you said the word "Unix" in a room of 10 people, they would think 10 different things. The education process we have ahead of us is to let people know that the Unix system consists of a number of applications that solve their immediate needs right now, which isn't always clear when we are talking to a group of customers.

Therefore, there are a number of applications capabilities that come

with Unix operating systems, and then of course you want to get into the marketplace where you pick up the applications of many other kinds of user segments, where people are writing them on your operating systems.

The operating systems go through phases — there's the operating systems phase, the utility phase and the application phase. And the Unix system is getting into that curve at a very high rate right now because of

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IN DEPTH

the transformation to the 16-bit micros from the 8-bit micros. Remember that 8-bit micro force has a big impact as you move into the 16-bit area that you can't discount. In the 8-bit micro market, there were a number of applications written on various operating systems, in particular CP/M became very popular on the Z80 in the 8-bit micro marketplace.

If you look at a number of projections, 8-bit sales are going to tail off in '83 and '84, and the 16-bit sales are

'I think the Unix system is in the position to be a de facto standard, and I think we want to work that with the user community. That's why we're on the standards committees.'

going to increase at a high rate. As you move from the 8-bit to 16-bit marketplace, there are a number of

applications that ran on the 8-bits and the operating systems associated with 8-bit systems that have not been

moved over to the operating system for the 16-bit marketplace. Those will be moved over as people get more and more access to the larger systems.

And so Unix is in position to be the de facto standard for the 16-bit market?

Well, I think the Unix system is in the position to be a de facto standard, and I think we want to work that with the user community. That's why we're on the standards committees. We were trying to work on a user standard when we made the arrangements with the microprocessor companies. If we don't try to work these standards issues, our customers will have a tremendous problem trying to put their applications on a system that might change unpredictably.

Back to the 16-bit market — is that one of the current goals of Unix? What is the strategy right now?

The goal of the Bell system is to work with the user community to make the Unix system the common basis for applications from micros to mainframes. Associated with that, we intend to work those issues to create what we call a generic base of Unix systems with standards groups outside. And we will continue to work these issues in public with our user community.

We're not going to put the Unix system in the public domain — be careful of that. Everybody comes back and says, "Why don't you put the Unix system in the public domain?" We're not going to do that. We, the Bell system, use the Unix system; we count on it. The operating system is very important to our needs.

What are the prospects of Bell bringing out a high-end micro?

If you go back two years ago to the ISSCC conference in California, we announced something called the Bellmac 32 microprocessor, that was our 32-bit microprocessor in VLSI. So you can see the Bell system is working Unix-based microprocessor systems.

Is there any time frame we can look for this?

Nothing we intend to announce now.

What about Unix on the IBM Personal Computer?

Well, there are Unix systems on the Personal Computer; that is one of the confusing things about our marketplace. I believe Microsoft's Xenix, which is a Unix derivative, is one. And it is a Unix system, but under our licensing policy at this point, we do not license our trademark. The only one allowed to use the Unix trademark is the Bell system. A

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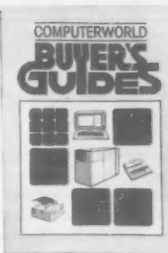
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- 38 Data Comm Network/Systems Mgmt
- 41 Engr/Scientific/R&D/Tech Mgmt
- 51 Mfg Sales Reps/Sales/Marketing Mgmt
- 60 Consulting Mgmt
- 70 Medical/Legal/Accounting Mgmt
- 80 Educator/Journalist/Librarian/Student
- 90 Other

3. COMPUTER INVOLVEMENT (Circle all that apply)

Types of equipment with which you are personally involved

- A. Mainframes/Supersystems
- B. Minicomputers/Small Business Computers
- C. Microcomputers/Desktops
- D. Communications Systems
- E. Office Automation Systems

UNIX STORY IN DEPTH

In Depth/10

number of other people have Unix systems on the Personal Computer. There's a company out of Boston that I believe has one called Venix, which also runs on the Personal Computer. So Unix systems do exist on the Personal Computer.

Something we should clear up here. To us there are Unix derivatives — those are systems that people derived from what they licensed from us. Remember, the Bell System owns that source. There are Unix

look-alikes, those systems built with functions like those in the Unix operating system. The principles are well known and taught in computer science classes. Those are systems that are not licensed. Then there's another sort of dimension — a Unix system run in native mode on a competing system, versus emulation mode.

The best way to describe the latter is to try to give an example. We've licensed the Univac 1100 System that

runs in emulation mode under the Sperry operating system on that computer. DEC has announced VNX, which is a Unix look-alike, which is an emulation.

The question again about the IBM Personal Computer — you have described Unix versions and Unix derivatives. But it's the mystique of Bell's Unix matched with IBM's Personal Computer. Is that a possibility?

I cannot announce what IBM will do. But I think if you look at when IBM came out with the Personal Computer, it came out with three operating systems on it. It came out with its version of MS-DOS, which it calls PC DOS. It came out with the USCD/P system, and it came out with a concurrent CP/M for the Intel chip. But I believe IBM encourages people to write their applications for the PC DOS.

Now, if you ask the question — When is IBM entering into a value-added reseller arrangement of the Unix system for the Personal Computer? — you need to direct that question to IBM. But I think if you look at what's happening in the industry, a number of people are putting Unix systems on their hardware. I think IBM's customers will ask IBM for it.

Regarding the port to the mainframe, as I understand it, that's an internal development effort. It's not that you're bringing Unix to a larger environment so that it's something you can later market.

Unix IBM 370 is licensable. It was announced in the same way that the Univac version was. I think that at this point the only one to license it has been IBM.

Do you think we'll see an emulation-type arrangement, such as what has come out with Data General and DEC and Univac?

There's some background you should have. We are not a VM shop at Bell Labs. We are a TSS shop; in fact, we are one of the few left in the world that focus on TSS. Therefore, we will make choices based on that.

I think that if you want to emulate the Unix system on VM, there are quite a few issues, but I think that there are people who will put it on VM and try to deal with issues of performance.

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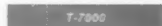
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IN DEPTH

There's not going to be one operating system. There are going to be multiple operating systems, and people are going to write applications for different operating systems as they see their needs. And the question is how are you going to be able to provide these applications for the consumer market, because that's the market that many of us are really after. That's where you are going to get the next big growth.

Is Unix suited for a one-user, one-computer environment?

Absolutely. In fact, the Unix system is more suited than some others. If you look in the office environment, you as a person run many functions in parallel, and the Unix system, with all of its multitasking, gives you that capability very, very well. So for a single user, you still need all of these capabilities to model what you do day to day.

You don't have to jump through hoops to have your printer running while you're doing something on your terminal and maybe dialing out to another computer at the same time. It's simple in the Unix structure for one person to have several things that they're working out at once.

"The question is how are you going to be able to provide these applications for the consumer market, because that's the market that many of us are really after."



Now the Teletype 5620 terminal, [for instance,] is not only oriented toward having multiple windows on your screen, which is not novel, but is actually running things in all the windows at once. It's not as if you move into one and the others are quiet. You've got processes running in each one.

Right now, though, don't users have to write a lot of code on top of Unix to get the needed functions for the office?

I think we've just started to see these applications becoming available.

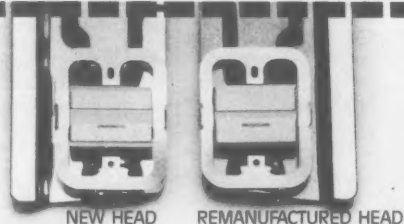
In terms of using Unix in a large

mainframe environment, would it make more sense for most users to be running Unix for development work, say in some smaller dedicated machines that are running Unix in a native mode, and then communicate as necessary with the mainframe to get data to upload?

It depends on your application, how big it is, and how your computing and data communications facilities are organized. At Bell Labs, we have the entire spectrum: small minis for program development connected to mainframes, mainframes partially running in emulation and, on large projects, several mainframes devoted to running the Unix system.

Can you see the use of Unix on a very large system as being a significant market?

Yes, I can see it in the following way. I argue that the microcomputer explosion that's occurring today is going to put computing on the desks of multitudes that never had it before. That's going to create a data explosion of corporate information, which in turn will create growth in the minicomputer market because the minicomputer is analogous to the



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IN DEPTH

local switch in telephone switching systems. The minicomputers are the ones that are going to tie together the department in a company. They're the ones who are going to have these microcomputers sharing information within a department.

These minicomputers in return will tie into the corporate mainframe, so mainframe use will grow due to the increase of information coming from new users of microprocessors. Because of that, you need

more crunching of that information to make it useful. The information will come back down on a distributed basis to each of those minis, and those minis will further distribute it to the micros. I believe you will see Unix systems as an important component across all of them.

For instance, if I run the Unix system at my micro on my desk, I may want to run the application on the mini or the mainframe. So I think you'll see use of the Unix system

grow, and its importance in the mainframes and the minis will be created out of this microprocessor movement.

That's one of the beauties of the Unix system that people have to keep looking at, to see that it provides a future evolution path up to the minis and mainframes. Companies are starting to see that now. We see more mainframe people asking us how to put Unix on the mainframe.

Unix spread from the educational to the commercial market despite Bell's hands-off attitude toward it. When did the strategy change? When was Unix recognized as something that could be, with a little push or little thought, moved into the commercial marketplace?

In the Bell system, we have had a policy to license many diverse technologies. This policy was derived from the Consent Decree of 1956. Unix has grown to be very popular. It's one thing that most people know about Bell. But there are a number of other technologies that you can license out of that same program. What happened is that we traditionally licensed versions that had been in existence for several years, which we weren't using any longer in the Bell system. The Unix system was looked at as a technology, but the 1956 Consent Decree did not address software issues. It only really addressed hardware. Software was really in its infancy in many ways in the business. So within that program, we started in 1974 licensing Unix systems to the universities. We started in on a basis that they could access and use it for educational purposes. The Bell system, Bell Labs in particular, has always tried to maintain good relationships with universities.

These university students would leave and they would want to use Unix in business outside. And then we moved to where we were licensing to recover some of the expenses for research and development. What kept happening is that customers kept asking for more and more from us. They kept wanting to know, "Why don't you support Unix? Why do we have to take something two years out of date from the Bell system?" Here's this large company that licensed a software package, who didn't support it, always told you to send your money up front and didn't

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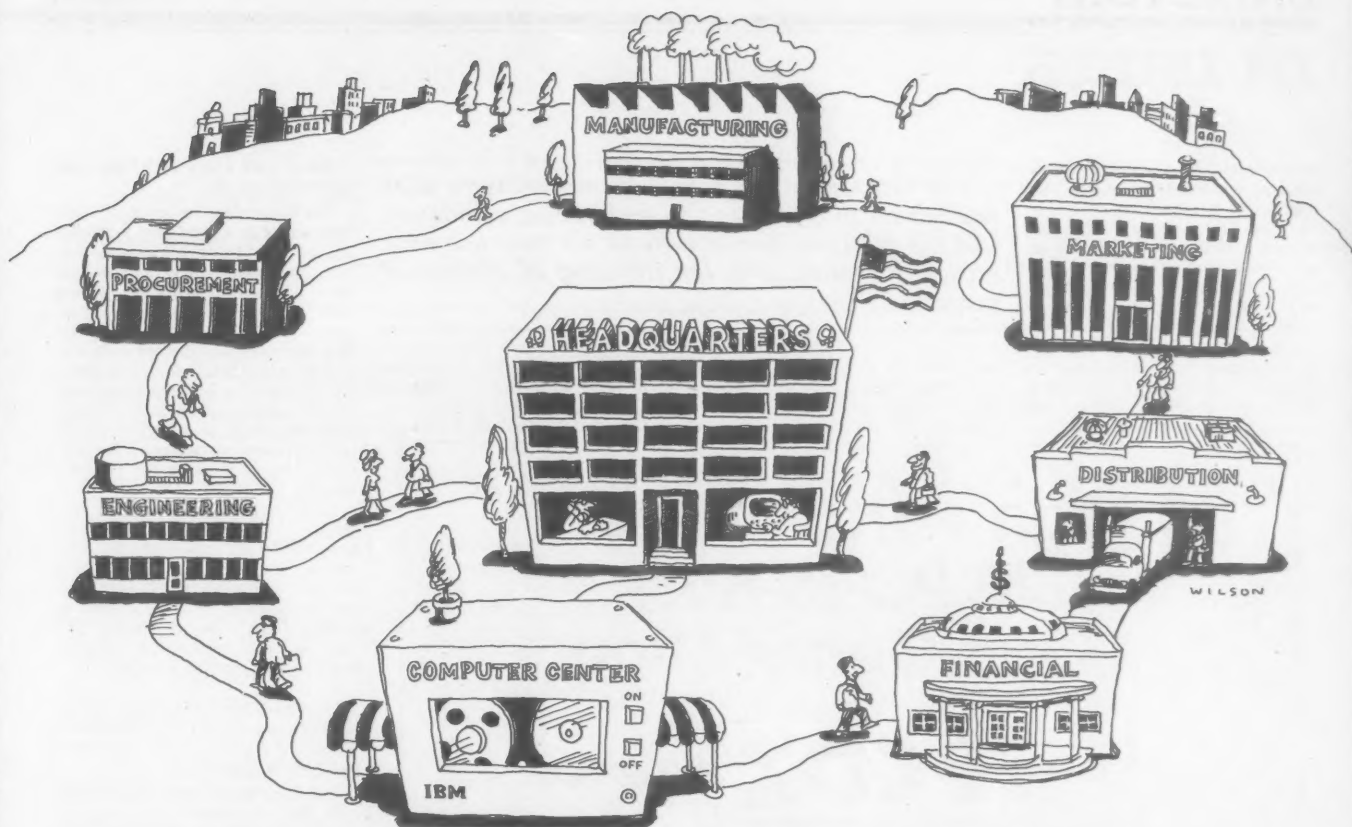
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IN DEPTH

answer any questions. No guarantees, no warranties — that didn't feel right.

What has changed is that we, namely AT&T, Bell Labs and Western Electric, are being thrust into a competitive market. We're going to be part of the information age, which consists of both computing and telephony.

The Unix system, clearly, is a vehicle that we can use to supply our customers with products in all of these

'The Bell system has always treated software as an intellectual property, and as such, being a company that has continued to sell systems, we have had some difficulty dealing with the licensing of intellectual property.'

areas. And the Bell system was chastised many times for not capitalizing on something that they invented,

namely the transistor. Unix is a good example of where we are trying to utilize what we came up with.

But it took you a very long time to start that push?

The Bell system has always treated software as an intellectual property, and as such, being a company that has continued to sell systems, we have had some difficulty dealing with the licensing of intellectual property. We are moving through that, especially with recent reorganizations in the Bell system and Western where lines of businesses were created. Jack Scanlon is vice-president, Processor and Software Systems Division, in charge of the processor line of business for Western Electric.

In January, we announced a version of the Unix system that is the same inside and outside the Bell system. On the other hand, we do have proprietary software packages that are not released, but the operating system is the same one inside and out. And also, you notice we now support the operating system.

How does providing that support change the way Bell does business? Doesn't that put you in a different business suddenly?

Bell Labs doesn't provide the support. Bell provides backup for the support that Western Electric experts maintain with the customer. There are escalation procedures for Bell Labs involvement. If Western can't solve it, they consult with the Bell Labs development people.

Does that put Western Electric, then, in a new business?

No, not really, interestingly enough. Western Electric has been supporting switching systems and operations support systems for the telephone companies like this for years. They have been monitoring and interfacing to switching systems all over the world. Western Electric has a Network Software Center in Illinois large enough to support software for the Bell system, and that's where we're supporting the Unix system. So this isn't necessarily a new concept for Western Electric.

Were there any legal constraints to Bell Labs or Western Electric actually marketing something like Unix or providing a supported version in the past?

None that we know of. It was more of a company policy decision. We were not under any legal constraints. There were, of course, groups of people who, if we'd have moved out into software, would have been very vocal about the Bell system doing that. It wouldn't have been simple.

Are the same companies making any problems now, or has your manner entering this area made a difference?

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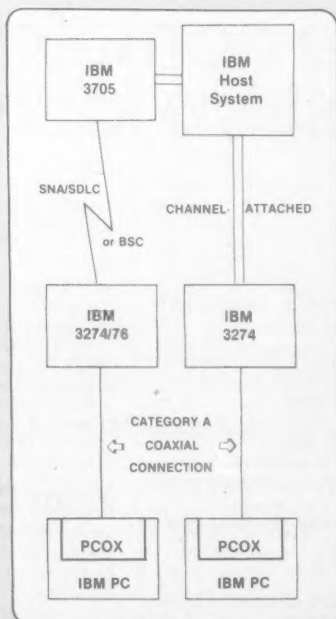
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the universities have gotten this thing inexpensively, they don't want it to change. It's interesting that other companies can make money off the product or technology that the Bell system develops, but if the Bell system wants to, it's, "Why is the Bell system doing this?"

Does your new software support for Unix put you into competition with companies like Microsoft and Digital Research?

I think that in any kind of relationship where there is a value-added reseller, there can appear to be competition. Now, Microsoft sells a Unix derivative called Xenix; therefore, they are one of our important value-added resellers, customers. In another dimension, which can be considered competition, Microsoft has another product called MS-DOS.

I don't see us in competition, and there's a concern that I have, and it clearly is something that will get played out in the marketplace. People like Microsoft, Unisoft, a number of other software houses and university students have come a long way to make the Unix system very popular in the marketplace. We have a strong need to make allies out of those companies and not fierce competitors. They've done an excellent job of getting the Unix system accepted.

Is the popularity of Unix surprising to the developers and people working on Unix now?

Like anything, people are extremely happy to see something happening. We're enthusiastic about the Unix system, and I think the people who originally started it feel good about what they started. But there's always that question... It's a lot like a parent when your child leaves to go to college. You have some remorse about sharing control.

There are other factors to account for the Unix system's growing use besides any inherent features. For instance, Bell Labs and Western Electric now support the Unix system, while CP/M is backed by a small outfit in Pacific Grove, Calif. And is there really any other operating system that can fill the niche of micro-to-mainframe portability?

That's a large niche. But seriously, I believe that portability will increase in importance as more and more software, applications and systems are developed. With the Unix system, I not only

know that I can choose from a wide range of hardware available today, but I also know that my investment in software will be protected into the future, since the Unix system can be moved

easily to newer, faster, less expensive hardware as it becomes available.

How profitable has Unix been for the Bell system?

The best way to look at

profit instead of bottom-line dollars is that the Bell system is committed to using Unix software in building systems right now. There are many indirect products, the quantification of which we have

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IN DEPTH

not tried to do.

Can I assume a substantial level of profitability for the Bell system?

We're still doing it.

Can Unix be measured against other Bell products?

The problem is that with operating systems, there are indirect and direct businesses. With the operating sys-

tems you license, you have a direct business. But the indirect business is all those systems that count upon the Unix system and that we use to build applications within the Bell system. That is an

indirect quantification that I'm sure probably ranks [the Unix system] with some of our top products. AT&T is committed to the Unix system; it's an important part of us. We use it on our products,

we're putting it on new processors and we're committed to working with value-added resellers.

What is Unix's status within Bell Labs? How do people feel about it?

The Unix system has been very popular with us for some time. The feeling is, isn't it nice that this popularity is spreading rapidly.

Isn't it real nice...?

Real nice. The Unix system is viewed as a valuable corporate asset.

One estimate recently predicted 190,000 computers will run Unix by December of this year and \$3.2 billion will change hands related to Unix-based hardware and software. Is that far off the mark from your view of the marketplace?

The 190,000 is not unreasonable because of the microprocessors. The \$3.2 billion — I can't comment on that. I suspect it has to do with software, services, hardware — everything.

When can we expect a new version to follow System V?

We are in the process of adding new features to the System V. We will put out a new version, but we have not announced a date.

What areas are being looked at for improvement?

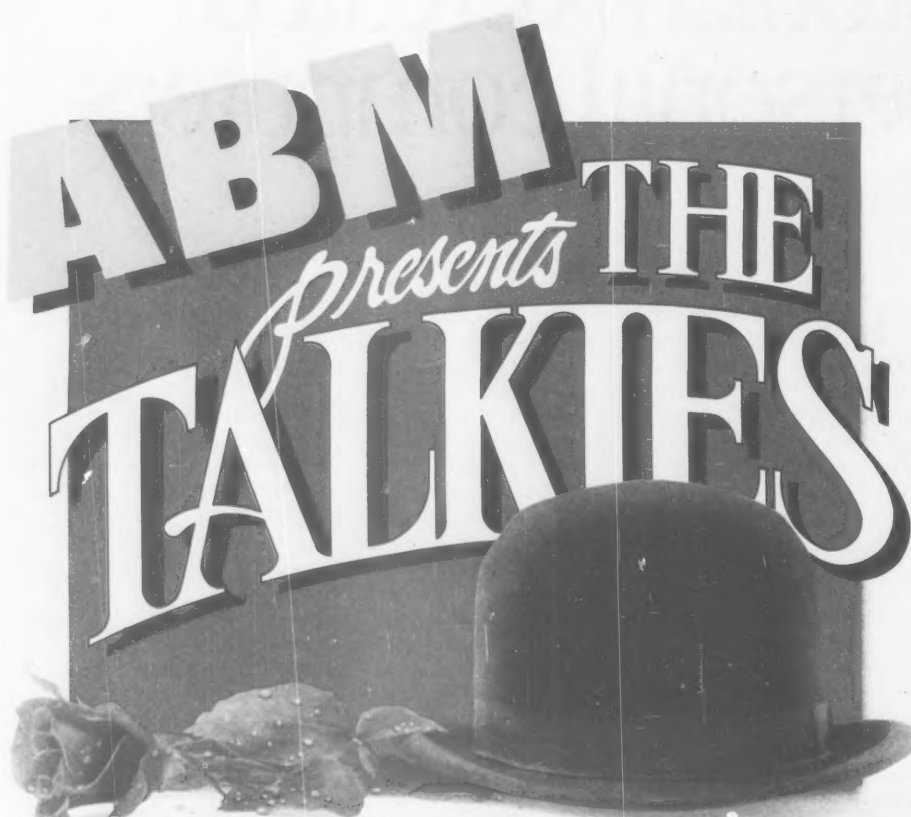
The Berkeley features are very important. Berkeley has done a very good job with the Unix system. Clearly, the issues having to do with paging are important to us.

Another issue has to do with performance. Performance was one of the major things we went after in System V; significant gains were made in System V over System III.

There were reportedly 1,000 modifications to get the System V?

Modifications is another one of those things that means different things to different people. The way we run our shop is the following: You have this base of source, and any change that's made to that source, including documentation, is a modification. That's the way we control the software.

The Unix system is multifaceted and sometimes confusing to people. We look at



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Day 1

8:30 - 9:00 A.M. Registration
 9:00 - 10:30 A.M.

G01: GENERAL SESSION

- Introduction to Performance Tuning Methodologies for MVS, IMS, and CICS Using Candle's Products
- Degradation Analysis
- Future Directions in Performance Analysis and Tuning

11:00 - 12:15 P.M.

G02: IBM's DIRECTIONS FOR THE LARGE SYSTEM ENVIRONMENT

- IBM's Directions and their impact on users
- The Evolution of MVS, VM, IMS, and CICS
- Effects on Performance Analysis and Tuning
- Extended Architecture and Beyond

MVS

1:30-4:45 P.M.

M01: SRM ANALYSIS AND TUNING

- SRM Functions
- Adjusting SRM Parameters
- Monitoring the SRM Using RMF, OMEGAMON, DEXAN, and EPILOG™
- MVS/XA Considerations

IMS

1:30-4:45 P.M.

I01: IMS COMMUNICATIONS

- General Communications Flow
- IMS Communications Pools
- Communications Queueing Considerations

CICS

1:30-4:45 P.M.

C01: CICS INTERNALS

- CICS Task Control Internals and Performance
- CICS Transaction Flow
- CICS Task Dispatcher Internals and Performance

Day 2

9:00-12:15 P.M.

M02: I/O CONFIGURATION ANALYSIS AND TUNING

- Detailed Analysis of How MVS Performs I/Os
- Optimizing I/O Configurations for Performance
- Shared DASD Considerations
- Differences in MVS/XA

9:00-12:15 P.M.

I02: IMS SCHEDULING

- General Scheduling Flow
- Scheduling Options
- Scheduling Pools

9:00-12:15 P.M.

C02: CICS PERFORMANCE TIPS AND HINTS

- Establishing Performance Objectives
- A Practical Approach to CICS Performance
- Performance Methodology and Detailed Solutions
- Operating Systems

1:30-4:45 P.M.

M03: PAGING/SWAPPING

- ASM Algorithms
- How to Configure the I/O Subsystem for Paging/ Swapping
- How to Measure the Impact of Paging/ Swapping
- MVS/XA Considerations

1:30-4:45 P.M.

I03: IMS APPLICATION EXECUTION

- Introduction to Execution Phases
- Application Phases
- Database I/O
- Data Communications Activity
- SYNC-POINT
- Database Pools Tuning
- Futures

1:30-4:45 P.M.

C03: CICS VSAM PERFORMANCE AND CICS STORAGE ANALYSIS

- File Control Functions
- VSAM Performance and its Effects on CICS
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IN DEPTH

it as the operating system, which consists of the kernel, drivers and essential utilities. Essential utilities exist in the area of system administration, shell, user environment, start-up and shutdown, backup and so forth. Then we have optional utilities. A good example would be a line printer spooler or basic networking capabilities for the interface to the Gcos operating system, which we have here. So, when we talk about those 1,000 modifications, one of the

problems is, how do they span all the areas.

You referred to the agreements with Motorola, National Semiconductor, Intel and Zilog. Can you sum up what these agreements do for the companies and Bell?

I think those agreements work for the industry and work toward a standard for the customer. Our customers need a basis to get at Unix operating systems to run their applications. Be-

cause the Unix system is licensed under many different names, that causes us concern, and we're continuing to investigate how to get over that. When you go out and make agreements with those people who port System V to their processors, you've got a basis now for working a standard. Those ports are done on those processors, and there's a key ingredient to that thrust. When they get done, the source, remember, continues to be owned by Western Elec-

tric. The source is in our catalog and people can now license it.

You can now come to Western Electric and license a version of System V that runs on any of a large number of computers. If you came to buy a license from the Bell system now, we would sell you something like the VAX-11/780 version. If you have a VAX-11/780, fine; if you don't have a VAX-11/780, you've got to go through the porting process. Now, once we get these additional ports done, you'll be able to license the source, go out and buy a computer that's in a significantly lower price range and put the Unix system on it.

There are two things: working a standard for our customers to interface, and the ability for people to come in and license a version of the Unix operating system that they can get on a machine very quickly and start writing applications.

In that way, does Unix represent an axis of uniformity in this industry where there are so many competing standards?

I think it does. Let me explain why by analogy. The Bell system telephone network is made up of many different machines running many different operating systems. It is a distributed operating system that we have managed to develop and continue to evolve. The Unix system is like that. It provides a uniform tying factor from micros to mainframes which the industry can capitalize on to get to the consumer market.

And consumers can capitalize, too, because now they have access to microcomputers. There are different machines, different operating systems, different interfaces. — they're very confusing to customers. The automobile industry solved that problem quite well — that's a very complex device that many of us can run. There are not that many people who can run computers. I think we need to provide a basis for solving that problem, and I think the Unix system provides that basis very well.



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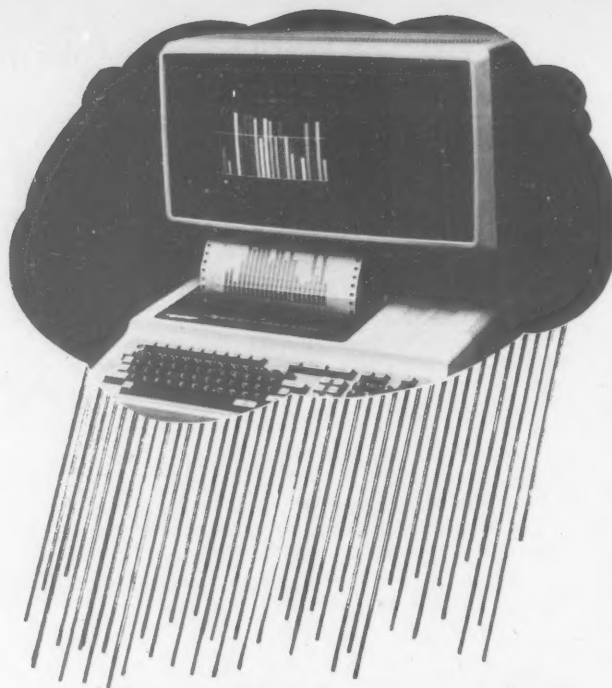
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FUNCTION ANALYSIS



Refining Information Engineering

By Thomas F. Haughey
and Robert M. Rollason

Function analysis is a data-oriented method for defining the real needs of a business and the structure of systems needed to automate its functions.

The technique draws on a combination of business knowledge, formal plans or goals and data models. It follows the data modeling process and provides a direct path into systems with tight coupling of data and function.

The approach produces a definition of functional requirements that organizations can easily convert into automated systems as program specifications or code.

Function analysis is a major enhancement to the group of analysis methods known as information engineering. Its goal is to produce systems that are:

- Correct, based on user involvement and cross-checks.
- Complete, based on the data guiding completion criteria.
- Communicable, based on graphics meaningful to all parties.

• Inexpensive and easy to maintain, based on transaction independence.

Information engineering techniques are intended to improve systems development productivity. They apply to any kind of business and are being used on an international basis in the financial, insurance, oil, construction, manufacturing and communications industries, as well as in government and education. Information engineering was designed to reinforce, not replace, any existing development methodology.

Function analysis merges some of the better principles of structured analysis with a new use of data models. It guides the project team on how to integrate data modeling with the analysis of business functions. It also creates a vehicle for involving users directly in requirements definition by showing exactly where and why they are needed and by directing what they should do.

Structured analysis, which was

developed in the early '70s along with structured design, has significantly improved the quality and productivity of systems. But it has not been able to keep pace with the applications backlog. Some flaws in its philosophy constrain it:

a) It starts by examining the current system in the sequence — old physical, old logical, new logical to new physical model.

b) It does not require business goals as a base, since it is predominantly an analyst's discipline.

c) Its graphics are not consistent with those used for business planning, information systems planning, systems and data base design.

d) There is no clear interface with information or data analysis.

e) There is difficulty in both the transition from the old logical model to new logical model and the move from structured design into structured analysis.

Function analysis retains many

IN DEPTH

excellent tools such as structured walk-throughs, inspections, team librarians and the concept of using progressively more detailed levels of documentation. The process starts top-down and later works bottom-up. But it bypasses the difficult transitions to produce a detailed, coherent, modular result automatically.

An Overview

Function analysis starts with top-down analysis of the target business

'Function analysis starts with top-down analysis of the target business arena. It then proceeds with bottom-up construction and a variety of quality tests. The scope of the project should be set beforehand in a feasibility study and refined in a project plan.'

arena. It then proceeds with bottom-up construction and a variety of quality tests.

The scope of the project should be set beforehand in a feasibility study and refined in a project plan. The

start of a function analysis project, however, is an appropriate time to review the project scope and adjust task estimates.

Figure 1 (on In Depth/26) shows a fundamental data model for a particular business function. Initial functional decomposition is guided by the structure of the data model produced by a prior information analysis project.

A data model consists of a graphical representation of the information needs of a given business arena supported by detailed definition of the data entities and data items. It depicts the policies of a business in the form of precise notation of how and why the data entities should be interrelated to become useful information. The relationships embody business policy.

First, top-down views of the business are produced, showing interrelationships between its functions and the underlying business cycle. The functions are broken into their major activities and the activities into their major procedures.

Next the project team works bottom-up, drawing on the detailed data items that form the data entities. They rapidly build a pool of "data access events" to allow the data to be created and maintained. Business people are heavily involved at this stage. In fact, they suggest conditions that result in these accesses being needed. They also define which data accesses or changes are "not allowed." These parameters are very important for security and protection purposes.

Guided by standard formats for different types of procedures, the team progressively builds up events into detailed structures. I/O events and process events are introduced into the structure as needed. The resulting procedures are constantly integrated into the top-down structure.

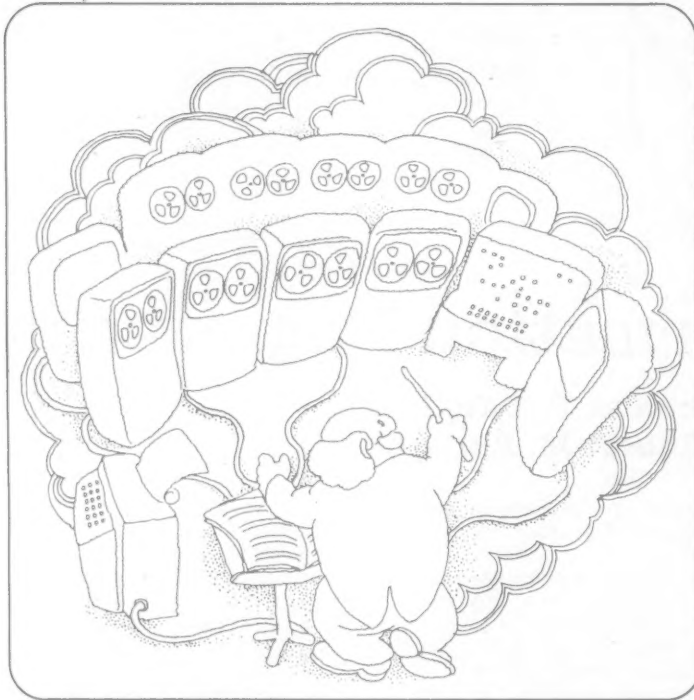
Testing Along the Way

A set of cross-check stages ensure that the design correctly represents the business. A design exercise does not have an answer as in mathematics. At best, the project team can increase its confidence that the results are correct. The cross-checks include a review of objectives and current systems to ensure no business needs are left out.

If need be, a stage is devoted to analyzing the decision-making processes. If possible, the goal is to automate "control" decisions and support "innovative" decisions by structuring the process as much as possible. Where the process cannot be structured, at least the required information can be provided. Stages for integration and resolution of conflicts follow together with an interesting new angle on setting application boundaries.

To provide another view of the optimum structure for the data model, the project team produces data usage maps. These illustrate how

together we could create a symphony



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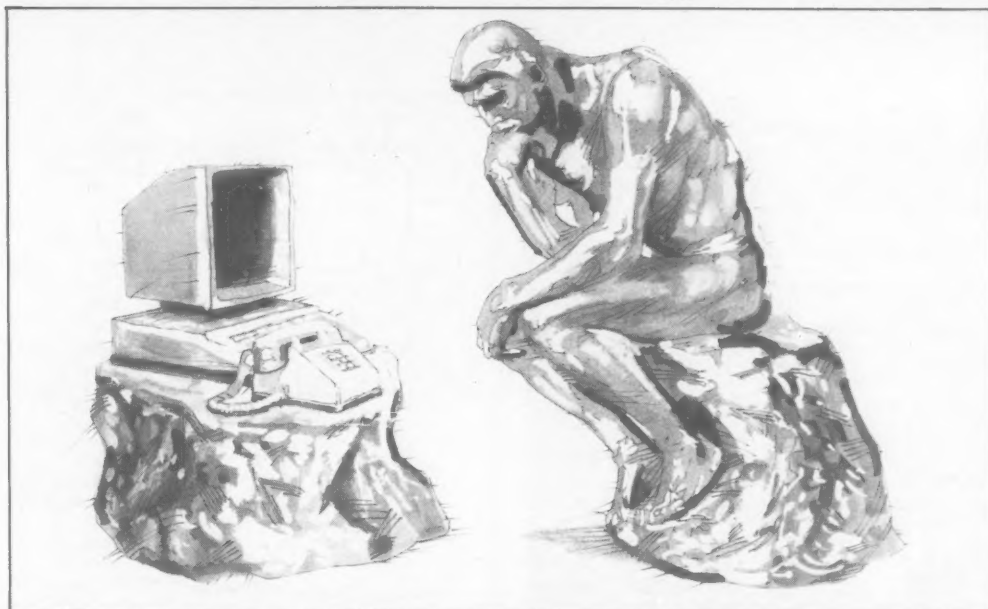


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Function analysis produces a report that sets out very detailed requirements for systems needed to support a business. It includes busi-

Results are produced more rapidly than with previous methods, achieve a higher level of modular cohesion and, because users are involved, are more accurate.

Activity Modeling

The first stage involves functionally decomposing the target business arena. This stage quickly gives a broad view of the result and provides a framework within which the more detailed stages can work. If possible, the project team uses the function maps produced by a previous planning exercise such as a feasibility study. Otherwise, team members build a map of each major function.

In building a function map, the fundamental business cycle is set out — as shown along the bottom in Figure 2. Next, up to five major activities are included within a particular function. Then those activities are related to each other and to other functions or activities. These may be internal or external to the business. To relate them, the map indicates the visible data that passes between them. The example shows several activities in the order processing divi-

```

graph TD
    N40[N40 CUSTOMER] -- ORDERS --> N110[N110 ORDER HEADER]
    N40 -- REPRESENTS --> N160[N160 SALES PERSON]
    N160 -- EARNs BONUS --> N165[N165 SALES COMMISSION]
    N110 -- CHARGED FOR --> N50[N50 INVOICE HEADER]
    N50 -- PAYS BONUS --> N165
    N110 -- "PRODUCT QUANTITIES" --> N112{N112 ORDER / PRODUCT}
    N112 -- "QTY DEMAND" --> N118[N118 PRODUCT]
    N118 -- "QTY SERVICED" --> N31{N31 INVOICE / PRODUCT}
    N31 -- "PRODUCT HISTORY" --> N140[N140 SALES RECORD]
    N118 -- REORDERS --> N119{N119 SUPPLIER / PRODUCT}
    N119 -- SUPPLIES --> N121[N121 SUPPLIER]
  
```

sion of Gizmo. A specific function and its activities can be delimited by using dashed lines.

Now the project team can use the data model to help decompose any activity into its component procedures. Figure 1 shows a fundamental data model for order processing that was produced as part of a previous information analysis project.

A basic concept used in various

ways in this technique is that data can be added, updated, deleted and retrieved. Using this fact, the team can build a pool of possible procedures straight from the data model. The names of these procedures are formed by combining the above particles with the entity name. For example, suppose one has the following entities: customer, order, line item, product, supplier and supplier/

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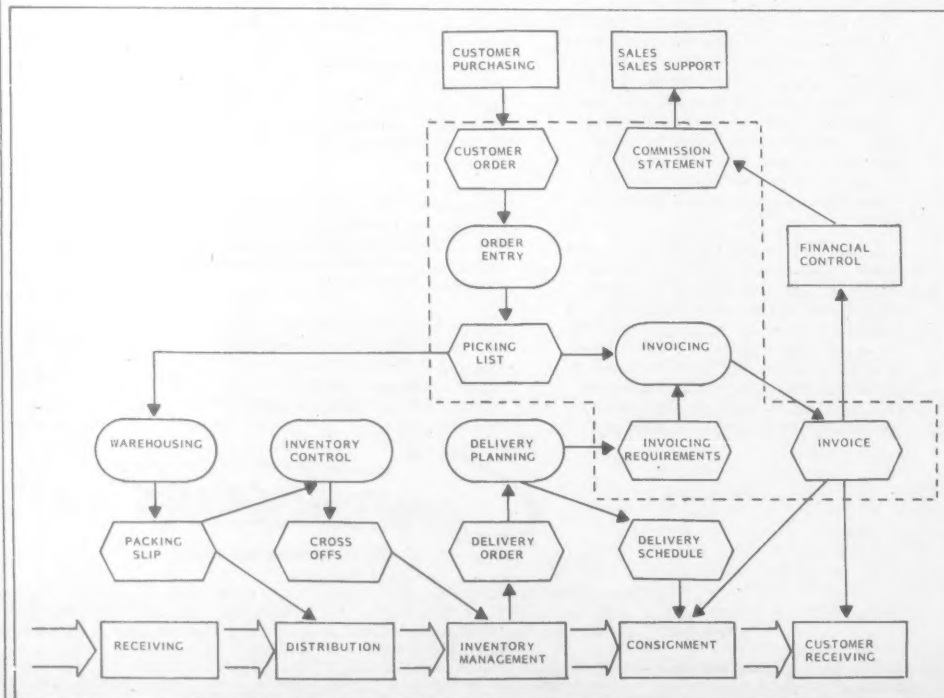


Figure 2. Function Map: Order Entry and Invoicing Function

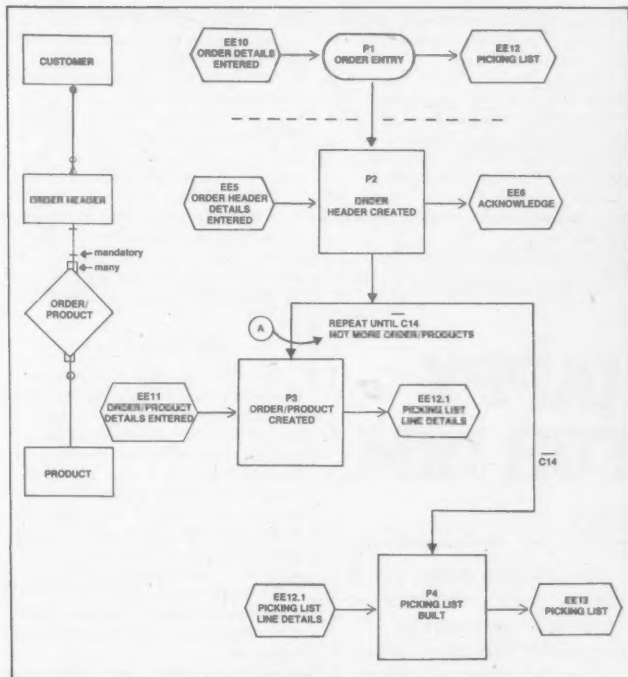


Figure 3. Model Guides Logic

product. The following procedures would be possible: customer added, order added, line item added, product added and so on.

The team can use the data model structure as a guide for relating these procedures, as shown in Figure 3. Previously we identified the need for an order entry (order added) procedure. The data model tells how to decompose this activity. An order is made up of common order header information plus a set of line items or order/products. We have "order header added" and "order/product added." The model says that order header cannot exist without one or more order/products. So they must come together as in Figure 3.

Figure 3 shows the overall order entry activity with its net inputs and outputs. Below this it is decomposed into the procedures and conditions it should contain — each with its own inputs and outputs. The model has "mandatory" indicators to pull

the procedures together. It also has a "many" relationship. This situation translates into repetitive use of "order/product added." The analyst can decide if a "DO WHILE" or "REPEAT UNTIL" should be used. The team will balance the overall inputs for the activity with the net inputs for the procedures. The same will happen for outputs. This suggests the need for a "picking list built" procedure.

Next, the team returns again to the internal details of the data model to help decompose the procedures into their events.

Event/Condition Analysis

To prepare for the decomposition of procedures into events, the team needs the data items for the data entities. The team first looks at their status at the time they are created (or added). Users indicate whether, when the entity is created, each item: 1) must be included (coded M for

ACCESS CODE	ENTITY	DATA ITEM	NATURE	EVENT	CONDITION
NA	ORDER HEADER	ORDER NO*	M	ORDER HEADER ADDED.	IF ORDER RECEIVED.
		ORDER DATE (DELIVERY ADDRESS)	M		
IA	ORDER HEADER	CUSTOMER NO*	O	OH CUSTOMER NO ADDED.	IF NOT COD OR IF CUSTOMER KNOWN.
IA	ORDER HEADER	ORDER COMPLETION DATE	P	ORDER COMPLETION DATE ADDED.	WHEN ORDER COMPLETED.
IU	ORDER HEADER	ORDER NO*		OH ORDER NO UPDATED. NOT ALLOWED.	
IU	ORDER HEADER	CUSTOMER NO*		OH CUST NO UPDATED. NOT ALLOWED.	
IU	ORDER HEADER	ORDER DATE		OH ORDER DATE UPDATED. NOT ALLOWED.	
IU	ORDER HEADER	DELIVERY ADDRESS		OH DELIVERY ADDRESS UPDATED.	IF CUST AUTHORIZATION GIVEN.
IU	ORDER HEADER	ORDER COMPLETION DATE		OH COMPL DATE UPDATED.	IF PRODUCTS RETURNED FOR REPLACEMENT.
ND	ORDER HEADER	ALL		O-H DELETED.	IF CANCELLED.
NR	ORDER HEADER	ALL		O-H READ	

Figure 4. Event Generation Table

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IN DEPTH

mandatory); 2) may be included (coded O for optional); or 3) cannot be included at that time (coded P for postponed).

Next a pool of possible data access events for each entity is automatically generated. This process again draws on the concept that data can be added, updated, deleted or retrieved. A table is built with all the possible options for each data item. Figure 4 (on In Depth/27) shows a sample with the possibilities: NA (entity

added), IA (item added), IU (item updated), ID (item deleted), ND (entity deleted) and NR (entity read). These are automatically generated based on the item nature.

Here again, users take part. They indicate under what conditions the accesses can be made or whether they are allowed. An access that is not allowed, such as the update of order number, is not discarded. It eventually goes into the pool of data access modules that if invoked will

send a rejection message. This provision allows anticipatory audit control at that level.

As the analysis continues, team members note any special logic that is part of any event. If this logic is generic, it can form a "process" event to be used by the procedure in conjunction with the data access or I/O events defined. Process events are events that do not require data accesses.

In the requirements definition

stage, the project team draws on the event pool to construct procedures. Standard templates of creation or maintenance procedures can be used to accelerate this task.

A procedure that creates an entity is made up of two things: 1) the event that adds its mandatory items (coded NA for "entity added" event) and 2) a structure of events and conditions that add optional items (coded IA for "item added" events for optional items not postponed). By definition, no add events that must be postponed (coded P) can be included.

Objectives Check

The team extends this base with validation events to ensure the entity is not already on file. Events that add foreign keys are also checked. By definition, these cause entities to be related, and the team must verify that the referred entity exists. This introduces some READ events and ERROR events. Figure 5 shows sample initial procedures "order header created" and "order/product created."

For each activity and procedure, it is essential to state a purpose as well as to identify any condition that may trigger it.

The data model, once again, is a focal point for defining the needs of the business.

Further refinement steps are used to explode the procedure. The team examines error events and looks at data items in entities read for validation, such as "Product read," to see if further processing requirement is suggested. In Figure 5, this suggests the need for updates to Qty-on-hand and Qty-on-order. Later the scope is expanded to allow handling of back orders.

At the end of most stages, the team conducts structured walk-throughs with users.

A formal cross-check of any objectives, strategies and tactics is now done. They are reviewed to see if implied procedures or logic have been identified.

From another angle, it is interesting to examine the stated purpose of the activities and procedures to see if they suggest strategies — as is often the case.

In addition, condition/event logic provides a guide to tactics at the operational level.

Decision Analysis

Now the team examines the objectives in a different way. It looks for the goal identified by any objective. Can it identify a unit of measure, level of the measure and time by which the objective is to be fulfilled? These items should have been addressed in a prior information analysis project, but are reviewed here.

If the goal is measurable, what fundamental data affects the measure? The events tell the team any procedure that updates this fundamental data. Should the measure be

(Continued on In Depth/30)

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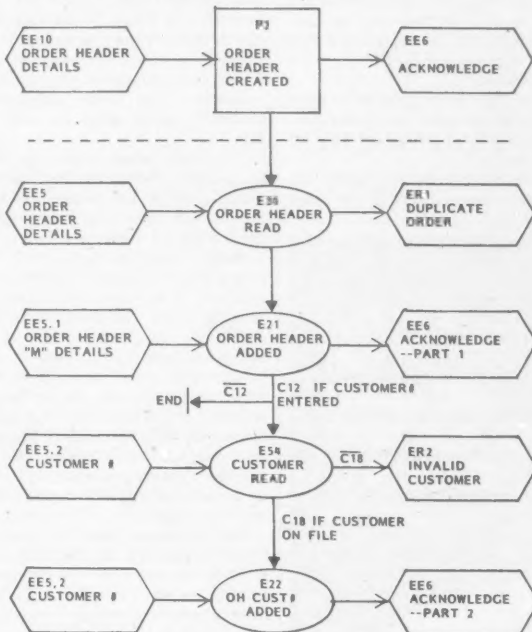
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INCLUDE "INTERNAL" CHECKS.
e.g. P2: ORDER HEADER CREATED



e.g. P3: ORDER/PRODUCT CREATED

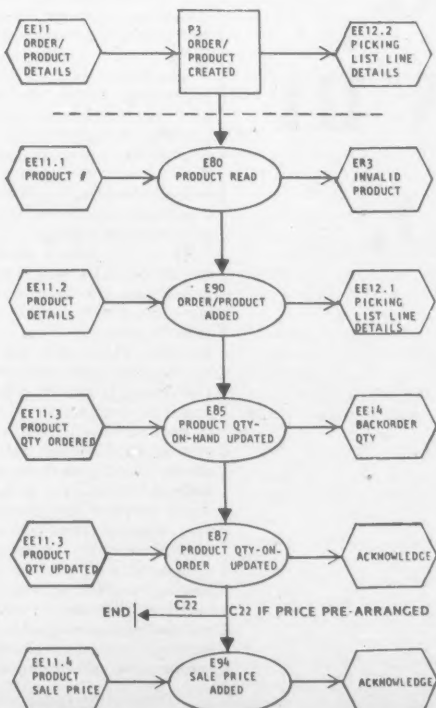


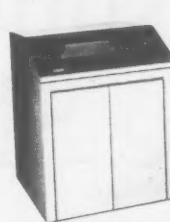
Figure 5. Expansion of a Process to Level 2

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IN DEPTH

(Continued from In Depth/28)
calculated when such data changes? Can special events (called "threshold recognition" events) be inserted in the procedures to calculate such a measure and compare it with predefined limits ("thresholds")? These provisions allow early warnings of situations that are out of line. What special actions are then required? Can these be broken out for automation?

This form of process analysis can

help decompose any decision processes to allow automation of some of the steps — particularly for control-type decisions at the operational level.

A related style of analysis is followed also when the project team looks at more "innovative" decision processes, that is, those that may change strategies or tactics. What is the information relating to a goal, as documented in a decision-type data model from information analysis?

What values of the related information are also significant? Can the team automatically check these other values or at least provide the decision maker with all the related data as well as notifying him of the need for a decision?

Some goals have qualitative measures or are judgmental, so the project team can not always go very far with them.

Before compiling the final business requirements report, the team

draws on the logic that is now in place to identify and map the way data in the model is accessed. This procedure is to ensure the data model will support the processing. It also provides a check on whether relationships in the model are needed or redundant and helps stabilize its structure. Usage maps are used for this.

The team builds data usage maps by simply identifying the data accesses used in any procedure. Most importantly, the team notes where the procedure needs to create or use an entity relationship. Also noted are places where indexes or direct access are used, as indicated by E in a circle (see Figure 6). The event table (Figure 4) tells the precise nature of any access and how it is indexed.

The team then produces a combined usage map for all procedures accessing the data model. This map is compared with the underlying data relationships to help resolve two situations: 1) usage paths not supported by a relationship or 2) relationships with no usage.

The combined usage map also assists in planning for implementation. It allows the team to see what data is needed if a given set of procedures is to be automated. It also shows what other procedures use that data and so should be interfaced or partly automated.

Final Documentation

A final business requirements report is produced for management to review. It also forms the input to the next phase: systems specification and design.

The report includes graphics and supporting tables. Structured English or pseudocode can easily be provided for any activity, procedure or primitive event. Figure 5, the order entry activity, is easily converted to Structured English. It is essentially a mainline, calling event modules or procedures as needed.

More interesting is the set of translation rules, which can be used to translate the logic of any event into Structured English. A typical event is translated from the event table using various key words such as allocate, establish, add, read or write. The choice is governed by the data access in conjunction with the type of data item: primary key, foreign key or fundamental data. Logic is also included from the event table as defined for that item by the user.

The result is that designers get a very detailed specification — often ready to be coded. The output can be used directly with fourth-generation languages, where appropriate. It also forms an outstanding definition of business requirements as input to most of the new so-called fifth-generation system/code generators.

Transaction Independence

A major goal of information engineering is to provide for inexpensive and easy maintenance of systems. To

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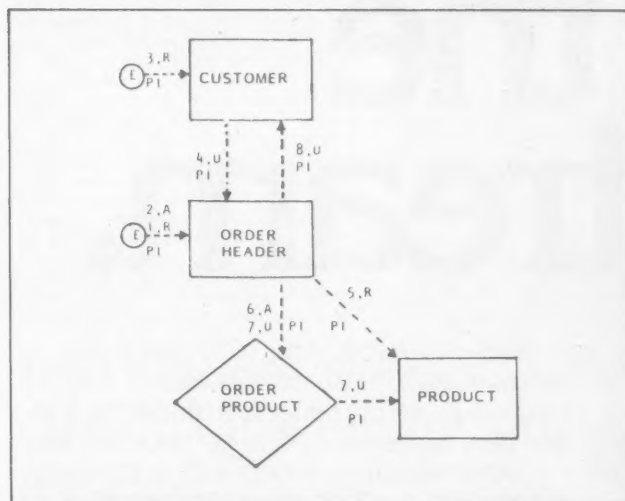


Figure 6. Data Usage Map: Order Entry Procedure

achieve this end, function analysis was designed to produce systems that have transaction independence.

Procedures are structured so that they form a mainline consisting of PERFORM statements. These calls invoke isolatable events or other procedures. The events they call are for data access, process or handling logical external I/O for the procedure.

This means that changes to data or data access logic are confined to data access events. All calls to data are made via these events so those that are not allowed can be intercepted. Data base systems should provide further independence from the physicals.

Similarly, any access from or to the external environment goes via the logical external I/O events. These isolate us from the specific format of any report or screen used in an on-line environment. The transaction, which represents a procedure when it is automated, always gets its I/O in the same format.

These events isolate business-dependent validations. Further out, specific screen or report formatting is handled using standard software. Then the network manager and teleprocessing access methods give us independence from the specific network.

Finally, the logic specific to any particular transaction is confined to the mainline procedure. This can be changed, as the business requirements change, to call different external I/O, data access, process events or other procedures with no impact on them. New data needs generate new events.

The process ends up with pools of reusable events and procedures. These are tracked via a system directory. Eventually, this directory should integrate with "active" data dictionaries that are referred to for the physical format and location of data during execution.

Experience worldwide with func-

tional analysis has been heartening. A U.S. government function is now implementing a system for facilities management that was designed by users with minimal assistance from DP prior to implementation. DP is happy with the quality of the specification and the high speed of the coding. The end users are pleased because the system meets their needs, and the project is well ahead of schedule.

A large domestic mail order company launched a major project using function analysis. User involvement was high. Business activities previously thought not to be automatable were satisfactorily automated. Function analysis allowed the firm to rethink business policy in several key areas, such as credit. The transaction independence of their system allowed the company to find and easily implement a major change imposed by a government agency.

About the Authors

Thomas F. Haughey is president of Management Archetypes Corp. of Concord, Mass., and Sydney, Australia. He has overall responsibility for developing an integrated methodology that covers the business span from planning to system implementation. He also develops component courses to support the methodology.

Haughey formerly worked for IBM as an advisory project manager and later served as senior consultant with Information Methods (USA) Corp.

Robert Rollason is principal advisor to Management Archetypes Corp. He was previously vice-president of Information Methods, which he joined after 11 years with IBM in Australia, working in business applications of on-line data base systems and Systems Network Architecture.

Rollason has been involved in management training and in guiding information engineering projects in Australia, Asia, the U.S. and Canada over the last few years.

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DEC Upgrades Speed Of Professional 350 by 25%

MARLBORO, Mass. — Digital Equipment Corp. has upgraded its Professional 350 microcomputer with several hardware and software enhancements it claims has increased the 16-bit system's speed and throughput abilities by 25%.

DEC also announced it has added an emulator to the PDP-11/23-based system that allows it to exchange files and data with both DEC and IBM host computers. Called the PRO-2780/3780, the emulator permits the 350 to communicate in batch mode with DEC VAX-11 and PDP-11-based minicomputers and IBM mainframes by emulating the communications protocols of an IBM 2780 or 3780 workstation.

The repackaged version of the desktop system features 512K bytes of main memory, twice that of the previous model, an in-

tegrated 10M-byte Winchester disk, also twice that of the original model, and a floating-point capability.

Software upgrades for the system include both hard disk and diskette versions of the P/OS operating system to support the hardware configuration; the Pro/Communications package for host communications and file transfer; a 2780/3780 batch communications facility; and three additional high-level languages for the vendor's Professional Developer's Tool Kit that allows users to program in Fortran-77, Cobol-81, Pascal, Basic Plus-2, C, Dibal and Macro-11.

The company has also made five additional application software packages available for the system that include: Supercomp-Twenty, a spreadsheet package; the NPL Information Management System, a



Digital Equipment Corp. has upgraded its Professional 350 microcomputer.

fourth-generation application development language; Fingraph, a visual management support system; Maps/Pro Financial Modeling, a VAX-11-based financial modeling program; and TKISolver, an equation solver.

All software written for earlier models will run on the repackaged version without modifications.

A spokesman said current 350 users will be able to upgrade their systems to the capability of the repackaged system with an upgrade kit the company will make available in September.

The 10M-byte version of the 350 with floating point and 512K bytes of memory costs \$8,590. The 5M-byte model goes for \$8,290. The diskette-based system costs \$5,595 with the diskette-based Model 325 costing \$4,595.

More information about the enhanced 350 is available from DEC, 146 Main St., Maynard, Mass. 01754.

IBM Releases Model III Version Of 6670 Laser Printer, Adds Fonts

PORT CHESTER, N.Y. — IBM has released the Model III, a version of its 6670 Information Distributor laser printer aimed at customers who do not require the copier capability of the 6670 Models I and II.

In addition, the 6670 fonts library has been expanded to include 25 new fonts. The fonts were designed to increase the available 6670 text type styles, provide limited graphics capability and provide additional type style compatibility with the IBM 3800.

The 6670 Model III reportedly functions as a laser printer-only version of the Model II, providing the same printing functions, attachments and software support. It does not provide the copier function of the Models I and II. Its purchase price is \$37,000. Shipments are scheduled to begin in September.

Also announced were decreases in purchase prices and changes in rental charges and leasing policy for the 6670 Models I and II.

The price changes for the Models I and II include:

- Leasing: Effective Dec. 1, new orders for the 6670 Models I and II will be accepted on a rental or purchase basis only. Lease orders placed before Nov. 30 and shipped by Jan. 31, 1984 will be accepted. Installed lease equipment will not be affected by this change.

- Rental: Costs for the Model I have increased from \$1,875/mo to \$2,490/mo; for

the Model II, costs have risen to \$2,640/mo from \$2,045/mo.

- Maintenance: It remains the same for both models (\$390).

- Purchases: The current Model I price of \$45,500 has been reduced by \$3,500; the Model II price has been decreased \$4,000 to \$45,000; and the cost of upgrading from the Model I to the Model II has been cut \$5,000 to \$3,000.

Cadmus Unveils 16/32 Bit Series Based on Motorola 68000, Unix



Cadmus Computer System's 9000 Series

LOWELL, Mass. — Cadmus Computer Systems, a start-up company located here, has unwrapped a Motorola, Inc. 68000-based system that reportedly supports 64 graphics terminals or 1,000 terminals via a 50M bit/sec fiber-optic link.

Dubbed the Cadmus 9000 series, the 16/32 bit systems are compatible with the Unix operating system and use the vendor's Unison software package, which provides any terminal in the network with transparent access to all resources. The systems can also transmit and receive information over Xerox Corp.'s Ethernet local-area network.

The three members making up the series include the 9730 Unix Workstation system, the 9790 Advanced Function and

(Continued on Page 54)

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Punched Card Readers Series Developed for IBM 5280

FRAZER, Pa. — Cardamation Co. has introduced a series of punched card readers and a card punch said to be the first ones developed for the IBM 5280 Distributed Data System.

The CR300/52 is a desktop unit that operates at a reading speed of 300 card/min. Additional models function at 200-, 450- and 600 card/min, a spokesman said.

The PC200/52 card punch runs at 100 to 285 card/min, depending on the number of columns punched.

Each of the units includes a standard Cardamation punched card peripheral, a bisynchronous controller and a diskette-resident software handler. The software allows standard

IBM 5280-series communication utilities to control the card reader and card punch. Use of a 5280 CRT display to monitor the card I/O is optional when the Cardamation units are processing cards.

The CR300/52 rents for \$200/mo and the PC200/52 for \$230/mo on a two-year contract. If both units are attached to the same IBM 5280 terminal, the rental price is reduced \$50 to \$180/mo. Monthly maintenance charges are \$100 for the reader and \$190 for the punch. The CR300/52 can be purchased for \$7,800; the PC200/52 costs \$9,500.

Cardamation is located at 446 Lancaster Ave., Frazer, Pa. 19355.

For IBM Micros

Disk Subsystem Unveiled

NORWOOD, Mass. — Science & Communications, Inc. (S/COM) has announced a 10.5M-byte disk subsystem for the IBM Personal Computer and its hard-disk-based follow-up, the Personal Computer XT, that is said to be three times faster than the IBM-supplied subsystems in accessing and transferring data.

Compatible with the Microsoft, Inc. MS-DOS operating system and Digital Equipment Corp.'s minicomputers using RL02 emulation, the 10R subsystem has an S/COM file conversion utility that allows users to exchange programs and data between their IBM Personal Computer and a DEC minicomputer.

The price of the 10R ranges from

\$1,490 to \$2,445. S/COM is located at 64 Broadway, Norwood, Mass. 02062.

Rebel Micro Based on Z80B

CARSON, Calif. — Tarbell Electronics has introduced the Rebel microcomputer, which is aimed at data base management, word processing, inventory control and mailing list applications.

The system is based on a Zilog, Inc. Z80B central processor with 64K bytes of main memory and contains 19M bytes of hard disk memory. The system operates with Digital Research, Inc.'s CP/M 2.2 disk operating system using Micropro International Corp.'s Wordstar word processing module.

The Rebel microcomputer is available for \$4,995 from Tarbell Electronics, Suite B, 950 Dovlen Place, Carson, Calif. 90746.

Start-Up Firm Unwraps Series

(Continued from Page 53)

the 9750 Advanced Function Graphics node.

The 9730 uses both the 68000 and 68010 microprocessors, contains 512K bytes of main memory, a 65M-byte Winchester disk drive with Sasi controller, a 1M-byte minifloppy diskette with controller, four RS-232C ports, Digital Equipment Corp. Q-bus expansion and the Unix operating system. This configuration is priced at \$13,750.

The 9790 uses the 10 MHz versions of both the 68000 and 68010 processors, contains 512K bytes of main memory expandable to 4M bytes, a 65M-byte Winchester disk with controller, 16M-byte streaming magnetic backup tape cartridge and controller, a 16-slot Q-bus expansion capability, a 17-in. monochrome display with mouse interface and a multiuser Unix operating system. The system lists for \$17,900. The Ethernet interface is available as an option.

The 9750 graphics node uses the 68010 microprocessor, has 512K bytes of main memory, a bit-mapped graphics controller, a 17-in. monochrome display with mouse interface, two RS-232C ports, Ethernet controller, Q-bus expansion capability and a virtual memory version of Unix.

Explaining the concept behind the system, Cadmus President Bill Southworth said, "the idea is to distribute the hardware resources — data storage and processing capability — and use the networking software to make the network appear to be a single system. Distributed systems are inherently more reliable."

Several Q-bus options are available for the three systems, including a floating-point processor and an array processor.

All three systems are expected to be available in September. Cadmus is located at 600 Suffolk St., Lowell, Mass. 01852.



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Epson America Adds WP to HX-20

TORRANCE, Calif. — Epson America, Inc. has made word processing software and microcassette storage standard features on its HX-20 Notebook Computer.

The company also announced an integrated office automation package and two printers for its QX-10 personal computer.

Skisoft, Inc.'s Skiwriter software for the HX-20 is available in read-only memory format and, along with the formerly optional microcassette drive, will not increase the HX-20's suggested retail price of \$795, a vendor spokesman said.

The valuable documents (Valdocs) package for the QX-10 has been produced by Rising Star, Inc. and is said to combine word processing, sched-

uling, calculations, graphics, filing and electronic mail.

The newly announced FX-80 bi-directional printer, priced at \$699, has a speed of 160 char./sec, provides nine by nine dot-matrix characters

and includes a 2K-byte buffer. The RX-80 dot-matrix, 80-col printer delivers 100 char./sec; it is priced at \$499.

Epson America is located at 3415 Kashiwa St., Torrance, Calif. 90505.

Enhanced Videoslides System Out

MENLO PARK, Calif. — Lang Systems, Inc. has announced an enhanced version of its Videoslides 35, a computer graphics camera system that enables microcomputer and graphics workstation users to produce color 35mm slides.

The enhanced unit is available in a 24-kHz line rate version, required for some microcomputers such as Apple Computer, Inc.'s Lisa and Nippon

Electric Co.'s Advanced Personal Computer, the vendor said.

The unit can produce slides for about 50 cents each. The unit loads standard 35mm film into the camera with the press of a button, the vendor said.

The 24-kHz Videoslides 35 costs \$3,049 including a camera, from 1010 O'Brien Drive, Menlo Park, Calif. 94025.

DP Firm Offers Risk Management To Insurers

NORCROSS, Ga. — A data processing services and software firm that sells mainly to insurance companies has begun offering a risk management system that reportedly meets the on-line processing needs of the claims and loss control business.

Allied Insurance Services, Inc.'s system is intended to be used primarily by self-insureds, claims administration personnel and loss control engineers, a company source said.

The system reportedly tracks claims histories and trends, automatically processes recurring payments and supervises on-line general liability and workers' compensation payment processes.

Allied also credits the product with performing a variety of other functions, including:

- On-line processing of all accidents, incidents and claims.
- Controlling reserve balances.
- Overseeing processing recoveries.
- Generating risk management and loss control reports, as well as providing a statistical analysis capability.

Price of the system ranges from \$30,000 to \$70,000, depending on the configuration chosen. It can be obtained from Allied at 4056 Wetherburn Way, Norcross, Ga. 30092.

UPS Series Out For Shops Based on Minis

ANAHEIM, Calif. — General Power Systems, Inc. has introduced a series of on-line uninterruptible power supply (UPS) systems designed for use in minicomputer-based environments.

Rated at 5,000VA, the GPS-5K120 series is said to operate from a 120 Vac, 60Hz utility power line with backup provided by sealed maintenance-free batteries. In the event of a line disturbance or power failure, the UPS reportedly will provide conditioned, regulated and continuous power.

The series, comprising eight models, starts at \$9,850 without battery, a spokesman said from 1400 N. Baxter St., Anaheim, Calif. 92806.

Realist Announces Microfiche Reader

MENOMONEE FALLS, Wis. — Realist Micrographic Systems has announced the Realist 475, a ¼-size microfiche reader that features an 8¼-by 11-in. screen.

The rear projection reader features an indexing system that uses a point of light to mark the location on the index grid. The unit also includes a constant in-focus feature that does not require the user to refocus when changing from frame to frame, the vendor said.

The unit costs \$279, the spokesman said, from Realist Micrographic Systems, Megal Drive, Menomonee Falls, Wis. 53051.

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Power Regulator By Topaz Targets Security Systems

SAN DIEGO — Topaz, Inc. has announced an uninterruptible power supply (UPS) for use with computer-based security systems.

A security system protected by the UPS will continue to operate even when commercial power fails or is intentionally interrupted. The UPS consists of a battery, battery charger, a static inverter and a power monitor. When the utility line is supplying power to the security system, the UPS battery charger changes incoming power from ac to dc to keep the battery fully charged. The inverter then changes the power back to ac to energize the system.

During the dc-to-ac conversion, the power is isolated and regulated to ensure protection against power disturbances that could trigger a false alarm. If the utility power is interrupted or drops more than 15% below normal, the unit turns on. The transfer to battery power occurs almost instantaneously, the vendor said.

The UPS systems are available in power ratings from 500VA to 1.5 kVA. The units cost from \$5,600, the vendor said from 9192 Topaz Way, San Diego, Calif. 92123.

Stands Designed For Micros Out From Input-Ez

DENVER — Input-Ez Corp. has introduced the Group II line of CRT terminal stands said to accommodate personal computers such as Apple Computer, Inc.'s Apple II, IBM's Personal Computer and models made by Commodore Business Machines, Inc., Radio Shack, Texas Instruments, Inc. and Atari Corp.

The stands are said to place hardware and documents into a configuration that naturally positions the body into the ideal ergonomic posture. The Group II stands feature a hinged, counterbalanced document platform that lifts and stays open for access to an area behind the keyboard for holding the CPU or disk drive hardware or for handy storage space. The CRT platform has 16 adjustments for correct eye-level height, CRT fit and light glare reduction.

Prices for the Group II terminal stands range from \$429 to \$545, according to Input-Ez, which can be reached through P.O. Box 3444, 7330 S. Alton Way, Unit E, Englewood, Colo. 80155.



VAX-11 Series Gets Vision Processor

BURLINGTON, Mass. — Users of Digital Equipment Corp.'s VAX series of superminicomputers can now

reportedly develop real-time image processing and machine vision applications with a just-announced pro-

cessor from Octek, Inc.

Intended for VAX series machines running under DEC's VMS operating system, the Model 2210/VM features real-time video digitizing, video-frame storage and direct-memory access to image memory.

The vision processor is also said to support monochrome and color displays, nondestructive text and cursor output and grey-scale and binary-image analysis.

All of the 2210/VM's functions are controlled through a built-in microprocessor, which can be programmed with the help of standard Fortran drivers, the spokesman said.

The processor costs \$7,600 from Octek at 7 Corporate Place, Burlington, Mass. 01803.

Decitek Offers 19-In. Punch Station

WESTBOROUGH, Mass. — A 19-in. punch station geared to the needs of numerical control equipment users has joined Decitek Corp.'s line of paper-tape preparation peripherals.

The Model 773 reportedly allows Ascii, EIA and ISO codes to be punched either from a terminal or directly from a numerical control machine at 75 or 50 char./sec.

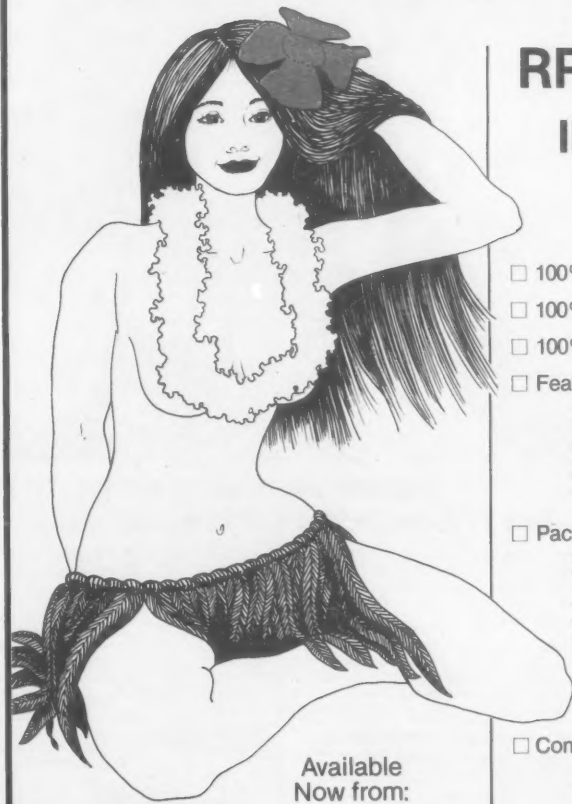
In its 75 char./sec version, the rack-mounted station accommodates both parallel and serial input at 50 to

1,200 bit/sec, a spokesman said.

The TTL/Facit-compatible parallel input can be strapped for positive or inverted signals, while the serial port conforms to RS-232C/V24 standards.

Equipped also with a 20/60mA current-loop interface and a DC2-DC4 remote-control capability, the punch station costs \$2,495 and takes four to six weeks to deliver from Decitek at 129 Flanders Road, Westborough, Mass. 01581.

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Compatible With Naked Mini Family Vendor Adds VLSI Tech to 16-Bit Mini System

IRVINE, Calif. — Computer Automation has extended its Naked Mini 4 series of 16-bit minicomputers with a system employing very large-scale integration (VLSI) technology and is priced \$745 cheaper than its predecessor.

Containing 128K bytes of random-access memory (RAM), the NM 4/12 is a half-card unit completely hardware- and software-compatible with the other members of the Naked

Mini family. The board's architecture includes eight programmable registers, six levels of priority-vectored interrupts, seven processor traps, direct memory access and auto and programmed I/O data transfers.

An optional 32K bytes of on-board erasable programmable read-only memory (Eprom) can be added to the device, a spokesman noted. Under software control, the Eprom can be enabled or disabled, overlaying the

top portion of the 4/12 address space, he explained.

Other memory features include a byte parity check to maintain system integrity and the provision of RAM battery backup terminals.

The system runs the vendor's three operating systems: the OS4, a disk-oriented programming system;

the RTX4, which provides the tools for creating real-time application environments; and Opus-1, a multiuser, multitasking system capable of supporting up to 16 I/O devices.

Price of the device is \$1,600 when ordered in single quantities, Computer Automation said from 18651 Von Karman, Irvine, Calif. 92713.

S-100-Based System Features Fixed/Removable Disk Drive

HUNTINGTON BEACH, Calif. — Advanced Digital Corp. (ADC) has introduced Super Star, said to be the first S-100-based computer system to be equipped with a 5M-byte fixed/5M-byte removable cartridge Winchester disk drive.

Super Star provides users with storage capacity equivalent to that of 50 5¼-in. floppy diskettes, according to the company.

A six-slot motherboard provides room for growth and expansion. More users can be added by plugging

in ADC's Super Slave processor boards.

Standard features include Digital Research, Inc.'s CP/M operating system, a 5¼-in. half-height floppy disk drive (compatible with Osborne Computer Corp.), switch-selectable 110V/220V power supply and a one-year warranty.

Super Star is priced at \$5,000. The Super Slave processor boards cost \$450 each. ADC is located at 5432 Production Drive, Huntington Beach, Calif. 92649.

For System 8000 Line

Zilog Micros Get Processor

CAMPBELL, Calif. — Zilog, Inc. has added an optional floating-point processor to its System 8000 family of microcomputers that, according to the company, provides the system's minicomputer-caliber performance.

The FPP-8/01 is a two-board set that uses a bit-slice architecture to implement, entirely in hardware, the full IEEE standard P754 (Draft 10.0) for binary floating-point arithmetic, the vendor said. It offers performance of 0.12 millions of floating-point instructions per second when implemented on System 8000 Models 21 and 31.

The optional processor plugs directly into vacant slots in the Unix-based System 8000 chassis. It communicates with the rest of the system over the Zilog Backplane Interconnect using co-processor architecture

completely transparent to the user. This allows not only assembly language programmers, but also high-level language compilers to implement numeric software.

The device performs all internal operations in double-extended precision with an accuracy of 19 decimal digits. A double-precision floating-point addition or subtraction reportedly can be performed in 3.6 microsec and a multiplication in 3.8 microsec. Square root and remainder-step arithmetic functions are supported.

The FPP-8/01 board set, priced at \$5,450, will be available in November. A System 8000 Model 21 (32M-byte Winchester disk storage), with the FPP-8/01 installed, is priced at \$28,400. Zilog is located at 1315 Dell Ave., Campbell, Calif. 95008.

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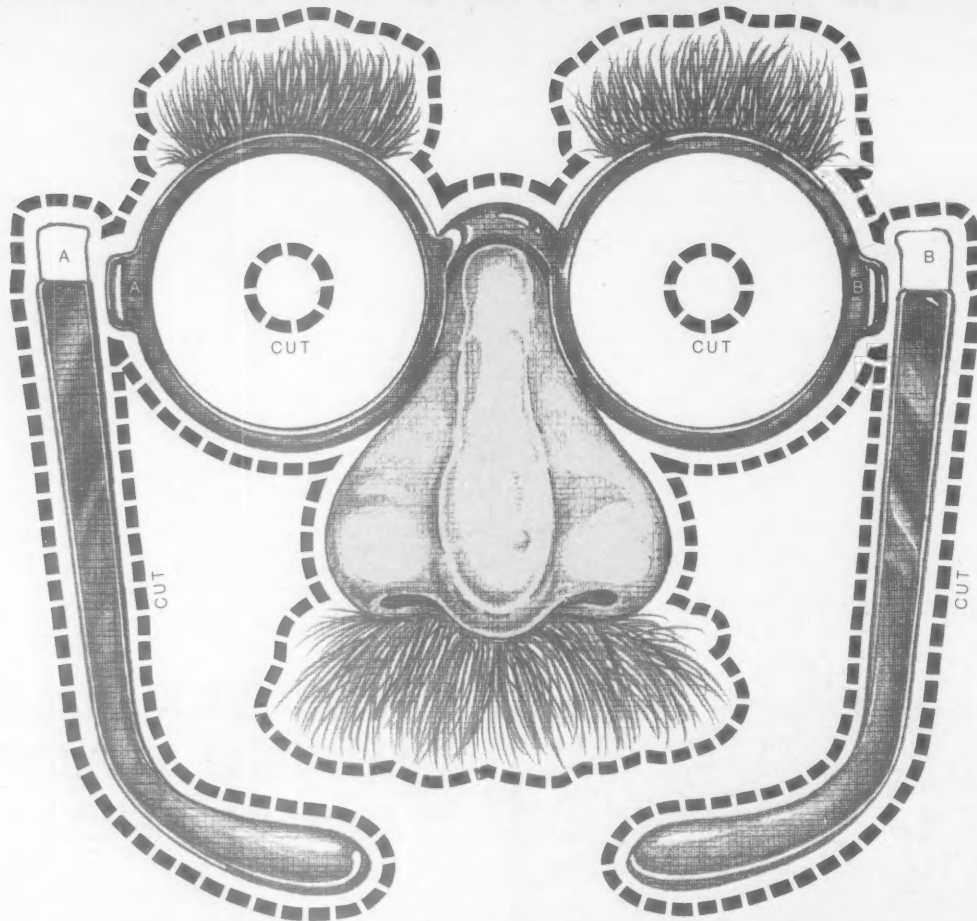
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1. *Datapro*: "User Ratings of Proprietary Software-COMLETE" November 1982. 2. *Computeworld*: December 20, 1982.

Other Offices: New York, Houston, Dallas, Los Angeles, San Francisco, Chicago, Philadelphia, Washington, D.C., Morristown, NJ, Stamford, CT/Representatives: Canada, U.K., Europe, Australia, Japan, Saudi Arabia.

Harris Unwraps WP Package For Z80s, 8080s

PROVO, Utah — A word processing package comprised of document, letter and mailing list features has been announced by Harris Micro Computers, Inc.

The Paperwork package was designed for use on any Zilog, Inc. Z80-based system or Intel Corp. 8080-based system using Digital Research, Inc.'s CP/M with 64K bytes of main memory or with any IBM Personal Computer-compatible system using Microsoft, Inc.'s MS-DOS with 128K bytes of main memory, according to a spokesman for the vendor.

The system features editing modes and an address data base allowing up to 62 categories of address classification, the vendor spokesman said. Output features are said to include printing in continuous form or on individual sheets of paper of letters, documents, envelopes, labels, address lists and phone lists.

Harris Micro Computers recommends 200K bytes of disk storage. Support software required for proper execution, according to a spokesman for the company, is either IBM's or Microsoft's Basic compiler modules.

The package is priced at \$69.95. Further information is available from Harris Micro Computers at 2560 N. 560 E., Provo, Utah 84604.

Training Program Out for Micro Users

MARINA DEL REY, Calif. — A training program for personal computer operators to learn Qwerty or Dvorak keyboard typing skills on IBM and Apple Computer, Inc. personal computers has been announced by Keyboard Productivity, Inc.

The Accutouch training program is contained on floppy disks and comes with a 54-page training manual, keyboard charts and progress forms.

The program provides instructions in the basic essentials of keyboard typing, followed by sections on correct keying techniques for alpha keys, top-line numeric keys and right-hand cluster keys. The course concludes with consolidation exercises and times exercises, according to the vendor.

The program is available for \$269. Further information is available from Keyboard Productivity at Suite 419, Marina Towers, 4676 Admiralty Way, Marina Del Rey, Calif. 90292.

Battelle Software Products Center Offers Office Automation System

COLUMBUS, Ohio — A data management system said to search and retrieve automatically information stored on word processors, electronic mail devices and other office automation equipment has been developed by Battelle's Software Products Center, a component of Battelle Columbus Laboratories Division.

Basis-OA, according to Battelle, combines information generated from office equipment throughout a company into one central file that employees can search to retrieve needed reports and other written communications. Information can be retrieved from remote terminals.

The system interfaces to Digital Equipment Corp.'s All-In-1 family of office

Hospital Remedies DP Ills With Local-Area Network

YORK, Pa. — With medical costs ever rising, data processing departments in small to medium-size hospitals are in a quandary. They are often forced to cut expenses to hold down patient charges, but do not have enough capital to invest in cost-saving measures such as local-area networks.

In 1978, York Hospital, located here, was one such hospital, using a shared service for financial and patient care data. The only in-house data processing was lab work performed on a Digital Equipment Corp. PDP-15, with clinical lab, pharmacy, blood bank and microbiology software.

Ed Sellers, director of data processing at the 572-bed hospital, appreciated the advantages of the bug-free shared service, but was growing uncomfortable at being locked into a uniform system, he said.

After talking with in-house users and visiting several outside sites, Sellers chose a turnkey system from Computer Synergy of Oakland, Calif. Running on DEC VAX-11/70 minicomputers with three Control Data Corp. 9766 300M-byte disk drives each, the Computer Synergy system handled admitting throughout the hospital, as well as accounts receivable, patient billing and other financial functions.

Two Principal Reasons

The principal reasons for selecting the system were two, Sellers said: better system-to-system communications standards for networking and that York could buy the source code for the programs and rewrite applications to suit its needs.

This past spring, York bought two Data General Corp. MV-6000s, each with three 300M-bytes System Industries, Inc. disk drives. It was then that York also began installing an Ungermann-Bass, Inc. local-area network.

"With four processors running different applications," Sellers said, "it was aggravating to impossible to switch between them — say, from the pharmacy to the financial systems. The network allowed us to connect the machines logically."

The network now permits the connection of any terminal to any processor, Sellers said, or any processor to another processor. "The advantages are many."

"Our programmers can access any machine without having to take the time to switch plugs," Sellers said. "Magnetic tape transfers between processors — which are what we used to enable the machines to talk to one another — have been eliminat-

'The principal reasons for selecting the [local-area network] system were two: better system-to-system communications standards for networking and that York could buy the source code for the programs and rewrite applications to suit its needs.'

ed, and users anywhere in the hospital can make inquiries from any terminal.

"The network has saved us from buying new hardware," Sellers said. "Instead of buying another tape drive — at a cost of \$15,000 — we simply use the network to copy disks, with a disk-to-disk file transfer."

"The cost of the network was approximately \$50,000 — less than the cost of hiring programmers to do the software linkages," Sellers pointed out.

Another benefit of the network is its potential for expansion. York plans to add surgical pathology software to its group of products and to investigate a Computer Synergy Patient Care System for full automation of individual patients' treatments, procedures and other care records. The hospital will then consider a move from the VAX-11/70s to the more powerful DEC VAX supermini.

The local-area network will remain the backbone of York's DP strategy, Sellers noted. Some DP health care professionals have decried local-area networks as unable to cope with the increasingly complex and storage-intensive medical technologies, such as diagnostic imaging, he said.

"We take a different approach. I look at the communications first and the application second," Sellers said. "A hospital can use a different network, each suited for the application need, and then bridge them, slowly adding storage as it adds applications. Local-area networks are coming into the forefront to organizations like ours that need to interface different systems cost-effectively."

Aisp Announces Two Committees

SAN FRANCISCO — At its recent Syntopian XI conference here, the Association of Information Systems Professionals (Aisp) announced the formation of two committees as part of Aisp's five-year development plan.

The Information Systems Education Committee (Isec) will be a coalition of vendors, users, educators and consultants who will create an awareness campaign to stimulate educational efforts to develop information processing professionals.

An Isec subcommittee, called the Aisp Standards Committee, will study and develop standard job titles and descriptions for use in all sectors of the information systems community. The standards committee will seek to develop and have approved electronic document communications standards.

More information is available from Aisp at 1015 N. York Road, Willow Grove, Pa. 19090.

Without Telex Hardware

Device Allows Connection to Telex

NEW YORK — A series of telecommunications devices said to permit owners of most computers, word processors or printers to interconnect with domestic and international tel-

ex systems without telex hardware has been announced by Teleface Corp.

Telexplug, the vendor said, is designed to adapt computer-related

equipment as the transmission media for entering telex, TWX or Direct Distance Dialing networks. The company has introduced seven models said to be compatible with the following networks: Western Union, Inc. Telex; Western Union TWX; Direct Distance Dialing; ITT Telex; Western Union International, Inc. Telex; RCA Corp. Telex; and Canadian Telex.

The systems include Teleface's Shareport feature, allowing the interface to be interposed directly between a computer or word processor and a printer or other output peripheral. It is said to be able to see any type of printed matter via Ascii serial asynchronous formats.

Basic price for each unit is \$1,270. Further information is available from Teleface, 111 Rivington St., New York, N.Y. 10002.

Dictaphone OCR Converts Typed Characters Into Bits

RYE, N.Y. — Dictaphone Corp. has introduced an optical character recognition reader that reportedly allows typed documents produced by outside sources to be entered into the data base of a word processing system without retyping.

The Dictascan reader is said to be compatible with the vendor's Dual Display and System 6000 word processor. The Dictascan reader reportedly converts typed characters into digital bits that can be understood and stored on the magnetic disks of word processors.

The reader can also reportedly enter pages of typed material into a

word processing system for storage or subsequent manipulation without retyping. The Dictascan can reportedly recognize up to eight typefaces and can automatically read multiple type styles and pitches on the same page.

The Dictascan ranges in price from \$9,950 to \$11,500. Dictaphone is located at 120 Old Post Road, Rye, N.Y. 10580.

Exos/101, NX/101 Enhanced

SAN JOSE, Calif. — A number of enhancements to its Exos/101 Xerox Corp. Ethernet front-end processor board have been announced by Excelan, Inc., which said the new developments prepare for full use of future developments in local-area network capabilities.

The integrated hardware and protocol software module is a single multibus board with a 16-bit Intel Corp. 8088 microprocessor. One enhancement extends the host memory addressability of the board to the 16M-byte standard.

Excelan's NX/101 Network Executive operating system has been enhanced to perform address and data

byte swapping between the Exos processor and the Motorola, Inc. 68000 used in some host systems, the company said.

Additionally, NX/101 firmware now has a network bootstrap facility allowing for loading high-level protocol software into the Exos/101 from the network, as well as from the host. To accommodate future firmware enhancements, Excelan said, it has doubled on-board programmable read-only memory from 8K- to 16K bytes.

Single-unit price is \$1,560, and further information is available from Excelan, 2180 Fortune Drive, San Jose, Calif. 95131.

Medical Info System Offered

PARSIPPANY, N.J. — Mohawk Data Sciences Corp. has added a medical information management facility to the line of office automation products supported by the firm's Series 21 distributed processing systems.

Mohawk's Medical Information System performs standard accounting functions and patient billing for hospitals and clinics with multiple locations and capacities of up to 200 beds, according to a company source.

The system's software, which Mohawk acquired through a license from Comp-U-Tech, Inc., incorporates seven modules that support applications like patient admission/discharge, billing, payables/receivables, insurance claims processing, payroll, general ledger and revenue

reporting.

Working in conjunction with the Series 21 hardware, the system allows claims data and related input to be transmitted through phone lines to major insurance companies' processing centers, the source said.

The first copy of the hospital information system's software costs \$21,000. For additional copies, volume discounts are available from Mohawk Data Sciences at 7 Century Drive, Parsippany, N.J. 07054.

WP System Available For IBM System/36, 38

CLEARWATER, Fla. — Oak Software, Inc. has announced the availability of its Word Processing System for use on IBM System/36 and System/38 computers.

Originally written for the IBM System/34, the system is said to include a full-screen text editor with 22 commands, automatic pagination, a built-in name and address file and spelling verification capabilities.

The price for the System/36 version is \$2,500, and the System/38 version costs \$3,500, according to the vendor.

Further information is available from Oak Software, Suite 315, 300 S. Duncan Ave., Clearwater, Fla. 33515.

Seminar: How to manage financial information more effectively.



Seminars on Cullinet's enter-it-once-enter-it-for-all Financial System will be held around the country at the dates listed below. To reserve a place call Harry Merkin at (617) 329-7700 or complete and return coupon below.

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Winnipeg, MAN

September 14
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December 1
November 30
September 7
November 22
September 28

Updated Version Of Select Out, Fits Victor 9000/Sirius

KENTFIELD, Calif. — Victor Technologies, Inc. has released an updated version of Select Information Systems, Inc.'s Select word processor package for the Victor 9000/Sirius computer.

The 2.21 version will run under the Microsoft, Inc. MS-DOS and Digital Research, Inc. CP/M 86 operating systems, Select Information Systems said, and will be packaged and distributed under the Select name. The earlier version was distributed by Victor Technologies under the name Victorwriter.

Version 2.21 is said to include such features as a windowing ability allowing users to view one document while editing another, a key feature allowing merging of boilerplate passages into text by typing the key number of the passage and background printing to enable editing of a new document while another is printing.

The product is priced at \$495. More information is available from Select Information Systems, 919 Sir Francis Drake Blvd., Kentfield, Calif. 94904.

Sac 1 System Manages Lists

PHILADELPHIA — Scriptomatic, Inc. has announced a word processing microcomputer system that includes Micropro International Corp.'s Wordstar software. The system is reportedly targeted for list management applications.

The Sac 1 system includes a full-screen terminal, dual disk drives and a dot matrix printer, a vendor spokesman said.

The system operates under Digital Research, Inc.'s CP/M operating system, a Scriptomatic spokesman said.

Applications are said to include list maintenance, sorting, printing of labels and reports and the merging of lists with word processing generated letters, a spokesman said.

Sac 1 is available for \$2,995 from Scriptomatic at 1 Scriptomatic Plaza, Philadelphia, Pa. 19131.

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And software is Cullinet.

Officesmith Introduced For Unix Users

OTTAWA — Officesmiths, Inc. has introduced an office applications development system with document management facilities.

The Officesmith is said to provide a multiwindow operating environment similar to that recently announced for Apple Computer, Inc.'s Lisa and Visicorp's Vision.

The package runs under the Unix operating system. It has been installed on Digital Equipment Corp., Zilog, Inc. and Spectrix microcomputers.

The package is available for \$5,000 from Officesmiths, at 331 Cooper St., Ottawa, Canada K2P 0G5.

Extends Functionality

Software Out for Wang's VS Systems

SHERMAN OAKS, Calif. — Software designed to extend the functionality of Wang Laboratories, Inc. VS systems has been developed

by Glenn A. Barber & Associates, Inc. (Gaba).

Extended Terminal Support (ETS) features message sending and receiving; error

positioning; and time-out, allowing the programmer to set a parameter for the time the screen operation is allowed to operate without activity.

Also featured is a virtual line capability, allowing several applications programs to be run simultaneously, according to a spokesman for

the company.

Release 1 of ETS costs \$500 for a single CPU, including 90-day support, documentation and 30-day money-back guarantee, the vendor spokesman said.

More information is available from Gaba at Suite 302, 15010 Ventura Blvd., Sherman Oaks, Calif. 91403.

Exxon Cuts Qwip Prices

STAMFORD, Conn. — Exxon Office Systems Co. recently announced price reductions for the Exxon 2310 Qwip digital facsimile unit and options, effective immediately.

The new prices range from \$5,845 for the basic unit, a reduction of 10%, according to a spokesman for Exxon Office Systems.

Further information is available from Exxon Office

Systems, 777 Long Ridge Road, Stamford, Conn. 06923.

OA Strategies Forum To Be Held Nov. 8-10

NEW YORK — An executive forum on strategic planning for office automation will be held here Nov. 8-10 at Windows of the World in the World Trade Center.

"Directions in Office Systems and Professional Computing: Which Way to Turn?" is being presented by the Boscom Center, the DP and communications market in Boston. The forum will be directed by Dr. Michael Hammer of Hammer and Co., Inc. and Patricia B. Seybold of Seybold Publications.

Among the speakers are Dr. Leonard Liu, vice-president and director of Office Systems Development of

IBM; Frederick A. Wang, executive vice-president and chief development officer of Wang Laboratories, Inc.; Julius L. Marcus, vice-president and group manager of Digital Equipment Corp.; and Frank Vigilante, vice-president of Product Planning and Development of AT&T Information Systems, Inc.

A registration fee of \$1,095 includes all sessions, coffee breaks, three luncheons and conference materials. For further information, write to Hammer/Seybold Executive Forum, Suite 801, 44 Bromfield St., Boston, Mass. 02108.

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IBM CAD/CAM Thrust Linked to Remarketers

By Ed Scannell
CW Staff

Despite its formidable mainframe offerings, even IBM will need the software expertise of value-added remarketers to usher it into selected computer-aided design and manufacturing (CAD/CAM) vertical markets over the next few years.

This was not the case in the mid- and late 1970s, when more emphasis was placed on the hardware half of the turnkey system. IBM and other hardware makers pursuing CAD/CAM marketing opportunities at that time did not require the more sophisticated software stylings of third-party specialists to turn a profit in this market.

But with users now more interested in integrating their manufacturing, engineering and administrative functions, the major emphasis is being placed on the data base management system and applications package aspects of these turnkey systems.

Analysis

Realizing it could not satisfy the demands of every niche in the CAD/CAM and commercial marketplaces, IBM established its value-added remarketer program 2½ years ago. While the company has recently signed major OEM agreements with Rolm Corp. and Intel Corp., where it will tack on software value to the hardware products of those companies, it had not signed a major contract where others would provide software value to any of its hardware products until two weeks ago, when it signed an agreement with Computervision Corp. [CW, Aug. 15].

The pact calls for IBM to supply Computervision with various hardware products, including its 4300 systems, which Computervision will integrate into its CAD/CAM software systems.

While it is unusual for a company like Computervision, which is the revenue leader in its market segment, to sign an agreement that can only help its closest competitor, IBM, most analysts think the agreement will increase sales for both companies.

Neil Kleinman, general manager of International Data Corp.'s Pacific Technology Center, said the IBM-Computervision pact may result in the "inter-section of what used to be a separate group, the CAD design group, with the traditional data processing group or management information systems organization."

Some analysts were surprised that IBM did not purchase a minority equity interest in Computervision as it did in the OEM agreements it signed with Rolm and Intel. "I think IBM would have bought a piece of Computervision, but it may have been prohibited from doing so by the Justice Department, be-

(Continued on Page 68)

Stock Sale Boosts National Semi

By Robert Batt

CW West Coast Bureau

SANTA CLARA, Calif. — In a much needed boost to its financial resources, National Semiconductor Corp. has pulled off one of Silicon Valley's biggest-ever stock sales with final proceeds likely to exceed \$200 million.

Through the sale of four million shares priced at \$48.75 each, the chip manufacturer raised \$188 million, enabling it virtually to eliminate outstanding debts and still have a surplus.

If the firm's underwriters decide to sell another 400,000 optional shares this month, total proceeds accruing to National Semi will be \$207 million, far surpassing

(Continued on Page 70)

DP Executives' Salaries Cooled by 1982 Recession

By Robert Batt

CW West Coast Bureau

PALO ALTO, Calif. — Salary increases for professionals in the computer and electronics industries slowed down over the last 12 months as the economic recession impacted the fortunes of information processing companies.

This is the major conclusion to emerge from a recent executive compensation survey just released by the American Electronics Association (AEA). The AEA did not release dollar amounts to go with its findings, claiming the wide variety of organizations surveyed prevented meaningful comparisons from being made.

Based on replies to questionnaires re-

ceived from 1,028 companies with sales of over \$1 million, the AEA study revealed that senior executives in quality assurance areas and professionals in research and development were the hardest hit by the recession.

According to the survey, quality assurance executives received salary increases averaging 6%, a drop of 2% over the previous year, while R&D personnel saw their average increases fall from 8.9% to 6.6%.

Chief executives of computer and electronics firms fared better, receiving average compensation increases of 8.2%, although this was also a drop of more than 2% over the previous year, the survey reported. Senior executives in manufacturing operations were also hit as their salary increases dropped to 7.5% from 9%.

The only professionals to show an upward trend during the recession were those involved in sales and marketing, with sales representatives getting average increases of 10.3%, compared with 9.9% the previous year.

Overall, the survey said, 1983 executive salaries increased approximately 7.9% over 1982. This compares with a 9.6% base salary increase in 1982 over 1981. The 1983 survey also found that bonus payments to executives in 1982 remained approximately the same as in 1981.

The use of various perquisites — 12 in all were measured — ranged from a high of 78% of all organizations offering automobiles to executives to 12% offering supplemental retirement income.

The size of the organization plays a big role in the offering of perquisites, the AEA reported, with large publicly owned organizations having a 25% higher probability of using at least one perquisite than privately owned ones.

But the survey claimed there is no evidence that these perquisites are being used in lieu of salary increases. On the contrary, it asserted, bonus-paying organizations show a 19% higher use of perquisites than nonbonus-paying organizations.

Further information is available from the AEA at 2680 Hanover St., Palo Alto, Calif. 94304.

New CDC Division Takes Off

By Bill Laberis

CW Staff

MINNEAPOLIS — Control Data Corp.'s

new software division, announced earlier this month [CW, Aug. 15], will be structured in large part like a holding company, purchasing or buying minority stakes in small software firms and then helping them manage their growth.

But in aspiring to become "a significant independent software supplier," the Control Data Software Co. must strive to avoid being swallowed up or manipulated by any of the other divisions or segments within CDC's \$4 billion-plus operations.

"Our objective is to meet the needs of the software market, not the needs of other Control Data entities," said Ted Rau, manager of new business development at CDC, in a recent interview. "We are first and foremost an independent organization... The [Software] Company means that Control Data is becoming more committed to the software industry. That's where the growth is."

Rau declined to put a dollar value on CDC's commitment to the software division, reaffirming only that the parent company stands "solidly committed" to building the unit.

Control Data Software hatched its first business relationship this month when it announced the acquisition of 25% of Holguin and Associates, Inc., a privately held

(Continued on Page 70)



And you can take that to the bank. Actor Robert Blake, center, accepts a donation of an Okidata Corp. printer to help Operation Child Guard in its effort to locate missing children. Presenting the printer are Okidata's Craig Ringuette, left, and J. Kent Henderson.

Enough to Avert Litigation?

Afips Details NCC Exhibitor Compensation Plan

By Jeffrey Beeler

CW West Coast Bureau
WASHINGTON, D.C. — The sponsor of last May's National Computer Conference has disclosed additional details of its two-month-old plan to compensate more than 200 NCC exhibitors for their travails in the show's sweltering pavilion exhibit

area.

The latest disclosures by the American Federation of Information Processing Societies, Inc. (Afips) call for each of the pavilion exhibitors to share equally in the payments that Afips is withholding from its NCC '83 air conditioning contractor.

Afips has also offered to

furnish each of the pavilion exhibitors with free copies of the names and addresses of its NCC '83 attendees. The mailing list, which can provide vendors with potentially valuable sales leads, usually sells for 7.5 cent/name, according to Afips' conferences marketing manager, Ann-Marie Bartels.

Together, the free mailing list and the \$113,000 in payments being withheld from the air conditioning contractor translate into roughly \$3,500 worth of compensation for each of the pavilion exhibit area's 216 occupants, Afips said.

During an Aug. 9 phone conversation, Bartels voiced confidence that the association's compensation offer will finally end the controversy over the exhibit area's heat and dissuade the exhibitors from filing a class-action lawsuit against Afips.

But Los Angeles-based attorney Michael Dempsey, whom the vendors retained last May as their legal counsel, termed the amended compensation offer insufficient. "Right now, everybody's evaluating it and deciding what to do next," he said. "But my own reading of the exhibitors' mood is that it's going to take a considerably sweeter offer from Afips" to avert litigation.

"After all, most of the [pa-



One of the attendees at NCC who got a bit hot in the un-air-conditioned tents.

vilion exhibitors] paid at least 10 times what they're current being offered just for booth space. If, on the other hand, Afips would make its latest proposal substantially — and I mean substantially — sweeter, there would probably be a resolution," Dempsey said.

Announced in a written statement dated Aug. 5, Afips' latest bid to placate the angry NCC pavilion exhibitors enlarges upon an earlier compensation plan that the association first outlined for the vendors in a June 17 letter.

In essence, the original proposal reportedly con-

tained promises that Afips would withhold payments from its air conditioning contractor, the Houston-based Mobile Air Conditioning, Inc., and divert the funds to the pavilion exhibitors as compensation for their NCC woes.

In its Aug. 5 statement, the industry association defended the withholding on the grounds that Mobile Air had allegedly "failed to provide [the pavilion exhibit area with] the air conditioning capacity called for in its agreement with Afips."

Mobile Air was called last week for its reaction to Afips' accusation, but no one at the company was immediately available for comment.

Although Afips' June 17 proposal endorsed the ideal of compensation in principle, the plan failed to mention any specific dollar amounts.

Threats of vendor-initiated legal action were triggered by a massive air conditioning failure in the six temporary exhibit "halls" that housed the exhibitor overflow from NCC '83's main show site, the Anaheim (Calif.) Convention Center.

Remarketers Helping Out Big Blue

(Continued from Page 67)

cause Computervision and IBM are number one and two in that [CAD/CAM] industry," according to Dale Kutnik, executive director of The Yankee Group, a Boston-based market research firm.

Most analysts believe IBM will continue to pursue similar agreements with other software houses, but think that it represents only one aspect of the company's overall corporate strategy.

"IBM has recognized the significance and growth potential of the engineering and scientific marketplace within the past year and is positioning itself to serve this market," Kleinman noted. "It also recognizes that OEM relationships are a part of this market and is beginning to act more like a Digital Equipment Corp. or Data General Corp. than an IBM. We are seeing the adaptability of IBM, but I wouldn't say it is an overall strategy to increase OEM business."

Kutnik also viewed the Computervision agreement as another example of Big Blue's changing attitude toward third-party involvement, but does not think it signals a trend.

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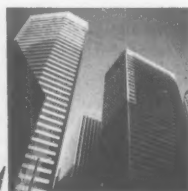
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Business Graphics Market To Mushroom: IDC Study

By Jim Bartimo
CW Staff

FRAMINGHAM, Mass. — Business graphics devices are expected to mushroom from an installed base of 383,600 in 1982 to more than 4.4 million in 1988, according to a recently conducted International Data Corp. (IDC) study.

What's more, the business graphics market will grow at a 47% compounded rate and will exceed \$1.4 billion in 1986.

The study, titled "Trends in Computer Generated Business Graphics," focuses on such devices as desktop computers, word processors, data terminals, graphics displays/workstations and dedicated systems.

Business graphics — once used only by large companies with mainframe computers — are now being used increasingly by smaller companies with micros, according to Debo-

rah Kelly, manager of computer graphics research, who helped conduct the study for IDC. But, "business graphics packages for micros will probably be phased out," she said. "Graphics will be included as part of other packages, such as [Lotus Development Corp.'s] Lotus 1-2-3.

"It's a lot more convenient to have an integrated package than to reformat your data for your graphics package to handle," Kelly continued. "This is not only a trend with micros, but with mainframe packages also."

Hardware and software suppliers are joining a trend of bundling graphics capabilities with new or existing products, such as application software and data base management systems, the study said. Some 49% of user sites reported use of business graphics systems that access their company's main data base.

Position in Organization	Type of Graphics		
	Data Representation	Presentation	Either Application
Top Management	64%	74%	75%
Middle Management	61%	62%	65%
Engineers/Technical Staff	52%	46%	54%
Computer Programmers	32%	21%	30%
Clients	22%	23%	27%
Sales Representatives	19%	25%	27%
Training Staff	15%	20%	19%
Secretaries/Clerical Staff	11%	7%	11%

IDC Chart

Use of Computer Graphics by Position

Also reported was that users want easy-to-use graphics, are satisfied with lower quality output than publication quality, use color and primarily produce paper output instead of slides or photographs.

Business graphics use will be stimulated by low-cost color displays and hard-copy devices. New ink-jet printer/plotters will sell for under \$2,000, the study predicted.

Other findings indicated that:

- Most graphics are used for management presentations or for planning and forecasting.
- While graphics are used for traditional bar, pie and line charts, other applications — such as organizational charts, logos and illustrations — are also popular.
- Productivity was found to have increased by 94%, and the demand for graphics has risen as a result.
- Use of color was reported by 90% of users, and color now represents 57% of output volume.

Hughes Aircraft Alleges Intel Infringed Patents

SAN FRANCISCO — Hughes Aircraft Co. filed suit Aug. 12 against Intel Corp., alleging patent infringement in the manufacture of metallic oxide semiconductor circuits and seeking preliminary and permanent injunctions.

Filed in Federal District Court here, the suit charges that Intel has infringed upon three patents "and has actively induced and is actively inducing others to infringe upon said patents." Hughes has asked for actual and treble damages in an amount to be determined at trial, along with attorneys' fees and costs.

Intel spokeswoman Rebecca Wallo said last week that the two companies have "been negotiating for some time about their claim, so we were surprised when they filed suit." She said Intel intends to defend itself against the charges.

The suit, filed by San Francisco attorney James L. Hunt of the firm of McCutchen, Doyle, Brown & Eversen, claims the patents at issue were granted to Hughes on Oct. 14, 1969, April 21, 1970 and Oct. 26, 1972. All three patents involve the manufacture of semiconductor circuits.

RCA Engineers Granted Patent

NEW YORK — Two RCA Corp. engineers have been issued a patent for their method of etching very tiny holes in the shadow masks of color tubes used to display computer data.

The shadow mask of a color display tube is a thin piece of metal that has thousands of holes etched into it. Smaller and more precisely etched holes in the mask may help provide higher resolution for computer readouts, the firm said.

The patent was granted to RCA engineers Raymond A. Alleman and Donald M. Weber.

Hogan, Citicorp N.A. Sign Software License Agreement

DALLAS — Hogan Systems, Inc. recently announced the signing of a third multiproduct software licensing agreement with Citicorp N.A. banks in a move the company said further cements Hogan's relationship with Citicorp.

The agreement was with Citicorp Person-to-Person, Inc. of St. Louis, and follows similar agreements reached with Citibank of South Dakota and Citibank, N.A. Private Banking & Investment Division of N.Y. Products covered under the agreements include Umbrella, Integrated Deposits, Prophet, On-Line Delivery, On-Line Collection and Loans Processing.

In a separate announcement, Hogan said it joined with Monchik-Weber Corp. and Continuum Co. to form a venture serving the financial services industry.

Inter-Financial Software will seek to identify industry-specific needs and provide customers with integrated financial products and services. Each of the three companies now

serves specific company needs, with Hogan serving commercial banks and thrift organizations, Monchik-Weber serving the securities and investment management sector and Continuum serving the individual life, health and annuity industry.

Joint Fund Targets Tech Development

PHOENIX — Three finance companies have announced the creation of a \$25 million venture capital fund aimed at developing high-technology companies in Arizona.

Called Sunven Partners, the fund was jointly created by Valley National Bank, the San Francisco investment banking firm of Hambrecht & Quist and Wescot Management Co. Wescot will manage and control the fund, with the other two companies joining as general partners.

The fund will target small- and medium-sized businesses, specifically those developing new and emerging technologies.

Introducing Computerworld Argentina.



Computerworld Argentina is Computerworld's new sister publication serving the Argentina computer community.

Argentina presently has approximately 2500 general purpose computers. CPU installations are growing at 25% annually and the market for minicomputers and terminals is growing even faster. Argentina's growing industrial and educational needs insure continued EDP growth in the upcoming years.

Computerworld Argentina reports on this market with coverage of the latest

local and international developments in hardware (micros, minis and mainframes), software and services, and office automation. A tabloid published twice-monthly, Computerworld Argentina is circulated to 5,000 professionals in the DP-related community.

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New CDC Division Strives for Market Presence

(Continued from Page 67)

vendor of computer-aided design and drafting software located in El Paso, Texas. The company will give Holguin management and financial assistance. Control Data Software will also work toward developing product, marketing and sales synergism among the discrete components, like Holguin, of which it will be comprised in the future.

Rau said the company intends to offer a full line of packaged software for a variety of users, including IBM mainframe and microcomputer software for the data processing manager; packages that allow users of IBM's Personal Computer to access CDC's computer services network; programming tools; and data center management tools.

Through Best Channels

The company will be free to market the packages through the best available channels, including software-only stores, CDC business centers or via existing channels already established by companies with which Control Data Software becomes associated. Rau said some packages may eventually be electronically downloaded via CDC's Cybernet time-sharing service.

However, Rau maintained, the packages sold and the software companies with which Control Data Software develops relationships will be geared to meeting the needs of the market, not those of CDC's four major divisions. Those divisions are computer systems, peripheral products, financial services and data ser-

vices, of which the software company will be a part.

Control Data Software represents the second effort in recent months to form a computer firm based on the holding company concept. Last month Kenneth Fisher, former president of Prime Computer, Inc., corralled a stable of ranking industry executives to form Encore Computer Corp. With no holdings at present, Encore intends to purchase 10 or

more small firms and integrate them under the Encore umbrella of management assistance and financial consulting.

Focus on Specific Solutions

Unlike Encore, which is not planning to target any one industry niche, Rau said Control Data Software will focus on specific, packaged software solutions rather than seek to become a software generalist. The

company will also seek to buy the marketing rights to certain software packages, without necessarily seeking to purchase part or all of the companies that own software.

Control Data Software is not planning to enter vertical markets with industry-specific solutions, recognizing the specialized marketing and product development talent that kind of move demands, according to Rau.

Venture Capital Spending Up: Journal

WELLESLEY HILLS, Mass. — Venture capital investment jumped 30% to a record \$1.8 billion in 1982, and the first six months of 1983 saw a record-setting pace with 33 funds attracting \$1.15 billion of new capital

commitments, according to "Venture Capital Journal."

Venture Capital said that spending in 1983 was 55% ahead of the 1982 level. The Northeast region, including Massachusetts, New York,

Connecticut and Rhode Island, attracted 50% of the capital committed in the first six months of this year, while California led all individual states with 36.4% of the total. Massachusetts claimed 27.6% of the total spending.

According to Venture, pension funds continued as the leading supplier of capital, contributing \$334 million or 33%. Stanley E. Pratt, Venture's editor, said that since 1978, pension funds have contributed more than \$1 billion to the venture development process, slightly more than 0.1% of total pension fund assets.

Jumping from fourth place on the investor list in 1982 to second place in 1983 were foreign investors, pumping in \$245 million up to the end of June, 30% more than the total foreign investment in 1982.

Comdex/Fall to Be Held Nov. 28 In Las Vegas Convention Center

LAS VEGAS — The fifth annual Comdex/Fall show, sponsored by the Interface Group, will be held Nov. 28 to Dec. 2 at the Las Vegas Convention Center.

In addition to an exhibit floor at four locations, Comdex/Fall will feature 52 work sessions focusing on business, financial and marketing topics of special relevance to the computer industry's independent sales organizations.

Comdex/Europe '83, a European version of Comdex, will be held in

Amsterdam, Netherlands, on Oct. 24-27. Registration for the Las Vegas Comdex show is \$195; one-day conference admission is \$100. Admission for exhibits only is \$25. Admission to the Amsterdam show is \$27.

More information is available from the Interface Group, located at 300 First Ave., Needham, Mass. 02194.

Stock Sale Boosts Resources For National Semiconductor

(Continued from Page 67)

ing the recent mark set by LSI Logic Corp. when its initial public offering raised \$152.3 million.

At the end of the fiscal year ending May 31, National Semi reported a net loss of \$14.2 million on net sales for the year of \$1.2 billion.

"National [Semi] has suffered more than most semiconductor companies during the recession of the last two years. This stock sale will allow it to regain its credibility and play in the big league," asserted Ted Costello, vice-president of investments at Dean Witter Reynolds, Inc., stockbrokers based in Palo Alto, Calif.

The company is expected to pay off much of its short-term debt — \$120 million in bank borrowings used for capital expenditures, including \$50 million spent in June on acquiring Data Terminal Systems, Inc., a Maynard, Mass., manufacturer of point-of-sale terminals.

"We have been running negative cash flows for a while, and this infusion of money will help us a great deal. We intend to bring new fabrication, test and assembly facilities online during this year, and the stock sale will allow us to build more capacity," commented Dave Dahmen, director of financial relations at National Semi.

According to Costello, the company has recently invested heavily in manufacturing facilities in Scotland and Salt Lake City, Utah, and in the building of three 5-in. wafer fabrica-

tion lines here at an estimated cost of \$20 million each. The company said it plans to increase capital expenditures over the next year to \$200 million, compared with \$130 million in 1982-83.

The sale of National Semi stock comes at a time when the semiconductor industry is making a vigorous recovery from its recent slump, with the industry book-to-bill ratio climbing to 1.5 from less than one last December.

According to Tom Hinkelman, executive director of the Semiconductor Industry Association, "the need now is to get production manned and new schedules set, in order to meet demand. While there will be some shortages throughout 1983, U.S. industry has the capacity to meet the upturn."

In a separate announcement, National Semi said last week that it has resumed plans to build a 290,000 sq-ft silicon wafer fabrication plant in Arlington, Texas. The plant's net worth upon completion will be about \$100 million, and it will employ 1,500 workers. Developmental plans for the facility were halted 18 months ago.

Commenting on the announcement, Charles Sporck, company president, said, "The upturn in the economy, coupled with strengthening order rates from our customers, allows us to move forward with our plans. The majority of engineering for the building has been completed."

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Datapoint Axes 150 Jobs in General Overhaul

SAN ANTONIO, Texas — In a move to cut operating costs further as part of a general overhaul of its business, Datapoint Corp. has elimi-

nated 150 jobs, most of them at its headquarters here, a company spokesman confirmed.

Most of the jobs permanently axed

were from the administrative support area, with no production, sales or marketing positions eliminated, the spokesman added. The reduction in force reduced Datapoint's worldwide employment role by 1.7% to 8,550.

The latest cost-cutting move is part of a companywide reorganization begun last year, when the company reported its first quarterly loss in a decade. Datapoint's stunning fall followed several years of high earnings, during which company stock became a Wall Street favorite.

The reorganization to date has included a divestiture of most of the company's communications manage-

ment business, highlighted by the sale of its Communications Management Products Division to Nevada-based Teknekron Industries, Inc. in June.

Datapoint has also revamped its domestic marketing structure, sold a Danish subsidiary to consolidate international operations and is presently restructuring domestic administrative functions following a companywide manpower-needs review, a spokesman said.

Datapoint earned just \$1.5 million on sales of \$136 million in its third quarter, ended April 30 and earned \$1.8 million on sales of \$134 million in its second quarter.

NCR, Archive Ink Tech Pact For Controller Development

COSTA MESA, Calif. — NCR Corp. and Archive Corp. have completed a technology exchange agreement to develop jointly a communications controller that implements small computer system interface (SCSI) on a 5¼-in. streaming cartridge tape drive.

Beginning the second quarter next year, NCR will take delivery of the controllers developed by Archive, and will incorporate them into its Modus and point-of-sale controller families of business computer systems.

SCSI is an intelligent bus and is used in peripherals such as Winchester disk drives and has standardized hardware and software interfaces

with host units, the companies claimed. SCSI is said to offer users and system integrators a low-cost method to interface peripherals to hosts and is being reviewed by the American National Standards Institute as a possible official standard.

IPL Reports Operating Loss For Quarter

WALTHAM, Mass. — For the second consecutive quarter, IPL Systems, Inc., maker of IBM-compatible mainframes, has reported an operating loss, this time losing \$327,000 or 6 cents per share on sales of \$3.2 million.

The results bring IPL's losses to \$574,000 or 11 cents per share for the first six months of the year. Stephen J. Ippolito, IPL president, attributed his company's loss to lingering effects of the recession and softening demand for mid-range mainframe computers.

Commenting on the results, Ippolito said, "While we remain cautious for the second half of 1983, interest in our Continuous Compatible Computer continues to be strong, and a sound backlog of orders has developed."

Quarter Earnings Drop 13% at HP

PALO ALTO, Calif. — Quarterly earnings at Hewlett-Packard Co. plummeted 13% during the company's third quarter to \$91 million or 35 cents per share as sales rose 6% in the quarter to \$1.15 billion, the company reported last week.

Income orders for the quarter, however, rose 25% to \$1.27 billion, with the greatest share of the increase coming domestically, the company added.

Commenting on the quarterly results, John Young, HP's chief executive officer, attributed HP's decline in earnings to higher marketing and selling expenses and some increased investment in research and develop-

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CW	Accounting Systems	101
CW	Disk Equipment	126
ISO	Dealers/Distributors	64
ISO	IBM-PC	84
ISO	Floppy Disks	51
ISO	Modems	45
ISO	Retail Stores	53

And that's a sample of just this year. We also have Indexes for *Computerworld* that go all the way back to 1976 and Indexes for CBN back to the first — (Nov. 1978-Dec. 1979)

If you don't have all the back issues of *Computerworld* and *ISO WORLD* that you need to get the articles you want, you can order back copies for the entire year on 35mm microfilm from University Microfilm, Int., Periodical Entry Dept., 300 North Zeeb Road, Ann Arbor, MI 48106 — at very reasonable rates. Or you can simply take advantage of their reprint service for individual articles.

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Expected to Quadruple by 1990

Europe Closes on Net Management Mart: Study

By Katherine Hafner

CW Staff

NEW YORK — The network management and test equipment market in Western Europe will quadruple between 1983 and 1990 to \$303 million, according to a recent market study by Frost and Sullivan, Inc.

While Europe already outstrips North America in its number of telephone lines and promises to outdo North America in the market for telecommunications equipment, Europe is catching up with the United States in the manufacturing of communications network management and test equipment, the study indicated.

The study predicts that European-based communications systems maintenance and management needs will force a market boom averaging over 22% a year from 1982 to 1990.

Dependency on Nets

"Failures in the data communications network are expensive to the user organization. Downtime today can mean significant loss," the study said.

"Organizations are becoming more dependent on their data network for routine business operations. This has led to a growing demand for specialized diagnostic equipment and systems to test, measure, control and manage network operations," the study said.

Introduced barely a decade ago, data network management and remote test systems form a relatively new industry.

And of the three market segments examined in the 365-page study (data line monitors, network technical control and network management and control), the management and control systems will see the greatest growth, from \$21 million in 1982 to \$26 million in 1983 and \$134 million by 1990.

Secondary Channel

The study defines network management and control systems as those using a secondary channel for signaling, whereas the network technical control systems integrate data line monitors with patching and switching modules without using a secondary channel.

"The high growth rate stems from the fact that [network management and control] systems did not begin to penetrate the European market until recently," the study noted.

The market in the United Kingdom dwarfs all others, accounting for one-quarter

of the European total in both data line monitors and network technical control systems, and one-third of the total network management and control systems market, according to the study.

Due to high levels of data communications usage and high penetration of private networks, Britain's dominance is expected to persist,

the study noted.

Followed by Britain are France, Germany and Italy, each holding 10% and 15% of the market in each of the three system segments.

"Networks in the early days were relatively straightforward with few links, and these were point-to-point, each supporting a single service or terminal," according

to the study.

"Today's communications links are not only point-to-point, but also point-to-point with time division and multiplexers, point-to-point with tail circuits, multipoint circuits, loop circuits and even multipoint with loop circuits, the study said.

In particular, the study cited systems that offer cen-

tralized control and testing of remote sites without the need for manual intervention as "valuable and cost-effective" solutions for an organization.

The study is available for \$1,700 from Frost and Sullivan, 104-112 Marylebone Lane, London W1M 5FU, England, or 106 Fulton St., New York, N.Y. 10038.

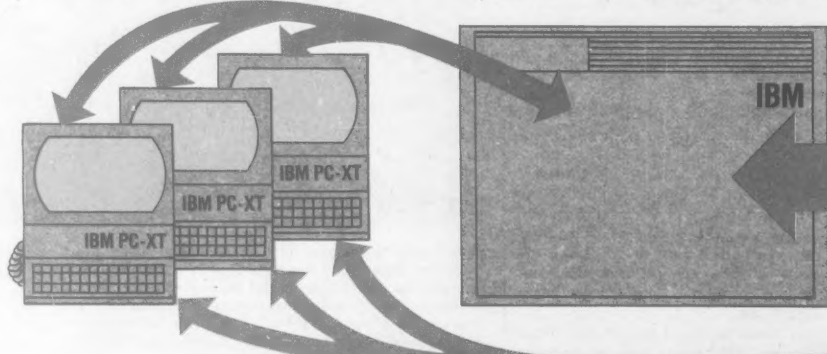
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Information Systems News,
June 13, 1983

QED to Offer 125 DP Courses

WELLESLEY, Mass. — QED Information Sciences, Inc. will offer 125 courses covering data processing topics in several nationwide locations beginning in September and continuing through next January. The courses are directed primarily at data processing personnel within corporations and government agencies.

Topics covered include: systems development, systems management, structured methodology, quality assurance, data base, data communications, cost-benefit analysis, interpersonal communications skills and managing and motivating data processing professionals. Recent additions to the curriculum include courses

on data security and controls, network design fundamentals, advanced CICS command level programming, programming in the C language and in Unix environments and the information center.

A course catalog is available from the vendor, located at QED Plaza, P.O. Box 181, Wellesley, Mass. 02181.

Executive Corner

• **John P. Courtney** has been elected to the board of directors of Computer Task Group, Inc.

• **Tom Mitchell** has been elected president and chief operating officer of Seagate Technology, Inc.

• **Dr. Guenter H. Jaensch** has been elected president and chief operating officer of Siemens Communications Systems, Inc.

• **Marion G. Durk** has

been appointed vice-president, corporate relations, at AM International, Inc.

• **John R. Novak** has been promoted to vice-president, manufacturing, for Datapoint Corp.

• **Lucien C. Coenen Jr.** has been appointed vice-president of western operations at Matra Datavision, Inc.

• **Robert L. Schwartz** has been named vice-president and a member of the president's office at Boole & Babbage, Inc.

• **John Celii Jr.** has joined 3Com Corp. as vice-president of finance and chief financial officer. **Charles D. Kempton** has joined the firm as vice-president of sales and marketing.

• **Philip B. Feinsot** has been promoted to vice-president, U.S. central operations, and **Thomas M. Palka** to vice-president, U.S. eastern operations, at Prime Computer, Inc.

• **William G. Nevers** has been elected senior vice-president, finance and administration, at Compucorp.

• **Ted Vosu**, former vice-president of manufacturing at Commodore Business Machines International, Inc. has joined Mindset Corp. as vice-president of manufacturing.

• **Charles R. Bush** has been appointed vice-president of manufacturing for Cromemco, Inc.

• **Douglas L. Rainville** has been named director of finance and administration at Computer Solutions, Inc.

• **Paul J. Duffy** has been appointed vice-president/finance at Timeplex, Inc.

• **Robert Trainer** has been appointed executive vice-president of operations at Ryan-McFarland, Inc.

• **Craig C. Tyndall** has been promoted to vice-president, programs, at M/A-Com Linkabit, Inc., a subsidiary of M/A-Com, Inc.

• **John L. Melanson** has been appointed vice-president of engineering with responsibility for all hardware and software development at NBI, Inc.

• **James R. Addlesberger** has been appointed vice-president of sales and marketing at Nixdorf Computer Corp.

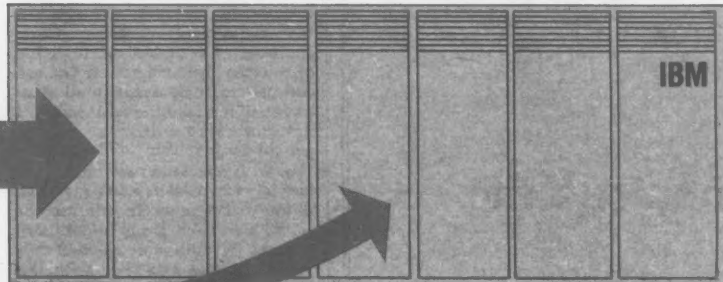
• **Ross A. Belson** has been appointed senior vice-president of operations at Lexidata Corp.

• **Al Kohn** has joined Data 3 Systems as vice-president of operations.

• **R.M. Medeiros** has been appointed vice-president, sales, for the Information Terminals Group, and **John J. Barry** vice-president, marketing, for the Interactive Products Division at Harris Corp.

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Analyst Urges U.S. Firms to Produce Offshore

By Robert Batt

CW West Coast Bureau

SAN FRANCISCO — U.S. Computer manufacturers must involve themselves increasingly in offshore manufacturing if they wish to retain a long-term competitive advantage, according to investment analyst Mike Murphy.

In a recent issue of his "Stock Letter," Murphy asserted that, while production costs are always important, it is the cost of quality control that is often the deciding factor in persuading manufacturers to go offshore.

"Quality control is still a labor-intensive operation, and there are many products that cannot find a wide market unless the quality is very high," Murphy added in a recent interview here. "Countries such as Taiwan, Singapore and South Korea have really caught on to the fact that high quality is the secret, and they can throw lots of people into testing and quality-control work, an area that in the U.S. is often bottlenecked."

Murphy cited the example of Qume Corp., an ITT subsidiary, making high-capacity floppy disk drives in Taiwan. "Assembly labor is \$1 per

'Countries such as Taiwan, Singapore and South Korea have really caught on to the fact that high quality is the secret, and they can throw lots of people into testing and quality-control work ...'

hour, engineers and programmers cost about \$500 a month and plant space is 22 cents a square foot compared to around \$1.40 in Silicon Valley. Most of the components can be bought locally, and the company is able to build drives with a lower failure rate than at its California plant," he claimed.

Because of relatively cheap manpower costs, Murphy said electro-mechanical components such as printers, disk and tape drives — requiring labor-intensive processes — are the most conducive to offshore production.

"With automated production machinery making pure assembly costs less and less important, the future of countries like Taiwan, Korea and Singapore lies in high-quality component and product production,"

Murphy said.

U.S. marketing organizations that move production offshore could gain a competitive advantage, Murphy asserted. "Computer software, for example, can be written more cheaply in Taiwan. A company with an IBM-based software system could have the system rewritten in Taiwan for other computers and then marketed more widely in the U.S. Floppy disk drives are another example."

There are also products like 64K-byte random-access memory (RAM) chips that can be built and sold from an offshore location with little or no specialized U.S. marketing, Murphy noted.

In sum, Murphy said, "Long term, it will be difficult for U.S. companies to compete in products that can be built and marketed offshore."

This last comment drew some disagreement from computer vendors. A spokesman at Harris Corp. said, "To date, we have found that we are better able to satisfy our requirements for manufacturing in areas such as superminis, interactive terminals and distributed data processing products by centralizing our operations in the U.S."

"With product cycles getting

shorter and product changes occurring more frequently, we find it more convenient to have our engineering and manufacturing facilities side by side in the U.S.," the spokesman added. The company does, however, have a semiconductor assembly plant in Malaysia.

At Hewlett-Packard Co., the philosophy is that price advantage alone does not necessarily dictate a move to offshore production.

"Expansion offshore is determined by business conditions, and in this, the technical contribution of the product as a whole, not just the price, must be considered in deciding whether to go offshore or not," a spokesman said.

HP employs 8,000 people in offshore manufacturing sites, including plants in Puerto Rico, Brazil, Singapore and Malaysia.

Victor Reports 23% Reduction Of Work Force

SCOTTS VALLEY, Calif. — Reeling under the burden of an \$11.1 million second-quarter loss, microcomputer maker Victor Technologies, Inc. announced it has reduced its permanent work force by 23% or 600 workers.

Victor, which went public last March, announced further cost-cutting moves, including the elimination of 200 part-time jobs, a hiring and salary freeze and consolidation of selected operating sites. The job cuts affected employees in all areas and at all levels of the business.

Victor's \$11.1 million, or 68 cents per share loss compared unfavorably with the same quarter a year earlier, when the company lost \$717,000. Revenues in the quarter rose to \$66 million from \$10 million. The loss includes more than \$2 million in charges associated with the expansion of the company's domestic sales force, Victor reported.

Causes of Loss

The company blamed its dismal operating results in part on the difficulty in obtaining double-sided disk drives, as well as "inefficiencies associated with the establishment of the new field sales and service organization."

Charles I. Peddle, company president, said the cost-reduction program will channel Victor's resources into areas that will improve operating results, adding that he anticipates "sharply improved results for the third quarter ... and a return to profitability in the fourth quarter."

Victor is the second so-called second-tier microcomputer company in recent months to reduce drastically its work force due to operating losses.

Last April, Vector Graphic, Inc. laid off one-quarter of its workers after suffering a \$1.3 million quarterly loss. Vector Graphic also shook up its management structure, with company founder Lore Harp reassuming the president's role there. Vector Graphic's second-quarter results are expected out today.

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Total Benefits Plan Needed to Attract Top Execs

By William J. Goldberg

Special to CW

Stock incentives attract top management.

That credo was an accurate description of how to find effective executives during the early period of the high-tech industry's growth. As new companies emerged, their founders and top executives rewarded themselves with considerable stock options from the company, but showed little inclination to provide other fringe benefits.

Today, the situation is one in which many companies have become successful and mature enough to provide fringe benefits. Attracting top executives and keeping effective members of the management team requires more than straight salary and stock. It requires a comprehensive executive benefits package.

Personal financial planning, as one of an executive's perks, is rapidly gaining popularity among high-tech firms. As these high-tech companies have prospered, the value of the stock held by the executives has greatly increased. Thus, the first set of fringe benefits has accomplished its goal, and a second set must be put into effect.

When offered to the executive as part of a prerequisite package, personal financial planning is usually paid for directly by the company, although some companies prefer to subsidize the cost. The counseling is designed to aid in tax and investment matters, and although funded by the company, its value can be used by the executive as a tax deduction to the extent that it represents tax or investment planning, offsetting the income realized as a result of the corporate payment.

Because of the relatively large price tag attached to this fringe (\$2,500 to \$5,000), the cost is justified primarily for top management, such as high-tech firms' founders, directors and senior executives, usually comprising individuals in an upper income and higher tax bracket. Middle management personnel, or those earning less than approximately \$100,000 a year, generally do not have sufficient discretionary income to warrant personal financial planning; a day-long seminar is an effective alternative for this group.

Principal Benefits

Financial counseling provides benefits to both the company and its executives. The principal benefits to each executive include both analysis and planning regarding taxes, investments, retirement and estate arrangements that result in additional discretionary dollars. In addition, the recipient realizes an important emotional benefit. Since the typical high-energy, high-tech company executive must balance priorities carefully each day — work, family and community commitments — little time is left for attending to personal financial strategies or keeping current with the rapidly changing and complicated tax laws. Financial planning gives the executive peace of mind by assuring that personal financial affairs are receiving the attention they deserve.

When choosing a company or in-

dividual to execute this planning service, both the corporation (usually the personnel department or board of directors) and the executives have several major concerns. First is the corporation's concern with the quality of the planner and the company represented, including the credentials and past history of the individual advisers. In addition, the planning firm chosen must be fully able to meet the needs of the executives, including those in satellite or branch offices. In this respect, national accounting firms generally have the edge, in that their offices located in major cities can effectively serve those employees.

Finally, cost plays a major role in determining which type of service

will be chosen by a corporation to provide its financial planning for executives. Often the ongoing hourly costs of an accounting firm are weighed against the one-time fee of an independent counselor or bank, whose additional income is generated directly from the executive through commissionable investments.

As the recent annual survey of 800 corporations by Hays-Huggins Non-cash Compensation Comparison (the Hays Group) suggests, personal financial planning is a prerequisite that is rapidly gaining popularity and seems destined to become a staple of the executive's benefits package. As salaries rise to keep up with the pace of inflation, more and more

executives are finding themselves in a position where they can benefit by the counseling offered by a personal financial planner.

For the high-tech company, the cost of productive man-hours lost by an executive's worry over tax and investment situations during work hours and the value of an improved state of mind far exceeds the fees paid for professional services. In addition, offering personal financial planning serves as a strengthening link in the executive's "golden handcuffs," helping to maintain the continuity of an effective and dedicated managerial team.

Goldberg is a certified public accountant with the Houston office of Peat, Marwick, Mitchell & Co.

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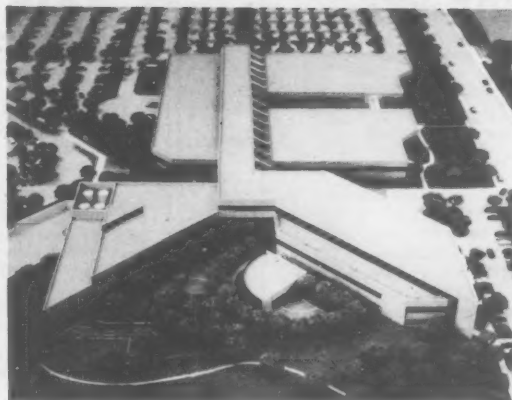
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Manager

You will prepare marketing material, train and motivate field and sales force, generate marketing requirements, and introduce new products. A BS in computer science is required; MBA preferred, as well as software marketing experience.

Software Engineering
Manager — Language
Development

You will manage the language development group and product planning for future language products, based on Berkeley 4.1bsd, 4.2bsd, and SYSTEM V UNIX*. A BS in computer science is required; MS in computer science preferred, along with 1-4 years' experience as software manager, preferably in compiler development.

Section Head — Software
Integration and Utilities
Development

You will develop new utilities under UNIX*, port existing utilities and do product packaging/release. One to four years' management experience with UNIX* knowledge are desired.

Sr. Software Engineers —
Compiler and Assembler
Development

Two to five years' compiler or assembler development experience with knowledge of C, Pascal, FORTRAN, and UNIX* are desired.

Sr. Software Engineers —
UNIX* System Architect

You will define a version of SYSTEM V for NS16032 and NS32032. Two to five years' experience in UNIX* kernel development are desired.

The Rewards Of
Elegance.

The elegance and power of the NS16000 will become evident as more software is developed for it. And those who develop that software will reap the rewards, personally and professionally. That's definitely something to think about if you're ready to take on the challenge of our opportunities.

To learn more about National's Microprocessor Systems Division, send your resume to Martha Senn, National Semiconductor, P.O. Box 60879, Sunnyvale, CA 94088. We are an equal opportunity affirmative action employer. Principals only please.

*UNIX is a trademark of Bell Labs.



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The Office Of Management Information Systems
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for its Bureau of Systems Policy and Planning.

Successful candidates will supervise 3 to 4 DP Analysts, specialize in 1 or more technical areas, assist in the planning of interagency systems and assist Commonwealth agencies to:

- identify DP needs
- assess hardware/software options
- prepare Agency ADP Plans
- procure DP and word processing resources

Applicants must possess excellent interpersonal skills, have significant experience in systems analysis and design, and in the management of DP professionals. Must be able to demonstrate technical knowledge in one of the following areas: IBM, Sperry or Burroughs MAINFRAMES; telecommunications; software development; distributed processing; local area networks; mini- or microcomputer applications. Salary: \$32K to \$36K, commensurate with experience.

For consideration, please forward resume and letter of application, in confidence, by August 31, 1983, to: Cathy Jackson, Personnel Specialist, OMIS, Office of Administration, 1 Ashburton Place, Room 411, Boston, MA 02108. An Equal Opportunity/Affirmative Action Employer.

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COMPUTER PROFESSIONALS HORIZONS AND OPPORTUNITIES UNLIMITED

HBH Company, a joint venture of three major international organizations, is involved in a celebrated assignment in support of the Royal Saudi Naval Forces. We have the following opportunities available in Saudi Arabia for highly-motivated, experienced computer professionals with IBM expertise for major application in an automated logistic system:

COMPUTER FACILITY DIVISION HEAD
You will assume overall responsibility for the operation of the Computer Facility Division, including resource planning, hardware and software procurement, software development, and supplies management. Experience in computer operations, system software programming, data base administration, and data entry functions required. You should have 15 years experience in data processing with main frame expertise, at least 5 years in supervisory capacity.

SOFTWARE SYSTEMS PROGRAMMER
You will maintain installed system software, evaluate and propose enhancements to backup, security, and other systems procedures, and design, test, and document specialized software, standards, and procedures. Five years of programming and software maintenance experience required to include VCN and ACS/VTAM.

SYSTEMS ANALYST
We need a systems analyst to formulate short, intermediate, and long term plans and operating procedures for the data processing system. You will design, develop, and implement plans in data systems structure to meet expanding system requirements. You will also provide technical guidance in computer systems policy. Six years of experience as a programmer analyst is required.

DATA BASE ADMINISTRATOR
You will design, maintain and control the data base and provide for the security, recovery and backup of the data base. You will also maintain the data dictionary, reorganize the data base when required and provide information and training for data base users. You should have six years of programming and/or technical support experience with at least one year of system programming and two years of data base design and management in maintaining ADF, IMS/DBDC and data dictionary software.

PROGRAMMER/ANALYST
You will assist in the evaluation of user operations to identify areas of potential improvement, design program logic, code programs in COBOL, prepare test data, and test programs to validate accuracy. You will also develop training material and assist in training users. You should have two years data processing work experience with at least one year in COBOL programming.

All positions are in an IBM 4341-2 environment, including 3350 Disks, 3203 printers, and 3278 terminals. Experience with the following software systems desirable: OS/VS1, VM/370, IMS/DL1, ADF, CMS, DB/DC, JES, VSAM, GIS, COBOL, BAL. All positions require at least a BS in computer science.
HBH offers excellent salaries and benefits as well as unlimited opportunities to develop your skills in a sophisticated data processing environment. If you would like to find out more about any of these positions, send your resume including salary history in confidence to: Manpower Resources, HBH Company, Dept. DP, Box 1289, Arlington, Virginia 22210. An Equal Opportunity Employer M/F.



VM/CMS

Harris, a Fortune 250 leader in the communications and information processing industry, is Florida's largest industrial employer. Located on Florida's Space Coast this is a fast-growing, high-technology community. We have an immediate requirement for an analyst specializing in VM/CMS for the Corporate Information Center.

We require 4 or more years with a large scale MVS or VM information center involved in programming or systems analysis. Knowledge of FOCUS, SAS, IFPS, INFO or similar packages is an advantage. Bachelor's degree is required, with an MBA a plus.

We offer an opportunity to join a team of professionals in a highly state-of-the-art environment. For consideration, submit your resume to: Information Center Staffing, Harris Corporation, Melbourne, Florida 32919. An Equal Opportunity Employer M/F.



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At ANACOMP, Inc., our business is supplying the international wholesale banking industry with the most technologically advanced software systems. ANACOMP meets the daily information processing needs of more than 7,000 customers worldwide.

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Senior Programmer/Analysts

Required: 6 plus years experience. Excellent analytical skills coupled with several years system development experience.

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Programmer/Analysts

Required: 4 plus years experience with COBOL and some system development experience and program design.

Desired: On line experience and/or database.

Testing Specialists

Required: 4 plus years experience in IBM hardware, Test Data Generator, system testing and user acceptance testing. Familiarity with structured techniques and analysis, data flow, and data structure design.

Desired: On line test experience. Also experience in developing system and acceptance test plans.

Programmers

Required: At least 2 years COBOL experience with at least 6 months on line experience.

Desired: Structured design/programming with exposure to large financial systems.

We seek candidates who want to be challenged. Our salaries and benefits are geared to attract innovative and talented people.

So if you share our seriousness about tomorrow, contact us today. Call or send your resume to: Ms. Sandra Warren, 201-585-9200.

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2 Executive Drive
Fort Lee, N.J. 07024

DEPUTY DIRECTOR OF ACADEMIC COMPUTING INDIANA UNIVERSITY BLOOMINGTON

Direct the activities of Bloomington Academic Computing Services, including all aspects of computing services delivery, data communications, computer operations, software support, user equipment acquisition, and user education. Monitor, evaluate, and recommend revision of systems to improve service or resource utilization. Develop and approve operating plans for the organization to ensure proper distribution of tasks. Work closely with Dean and faculty to guide long term direction of Academic Computing at IU.

Masters degree as well as at least 7 years work experience in the area of computing, preferably in a university, is required. A terminal degree is preferred but not required. Candidates must have at least 5 years experience in managing a major functional area within a computing center (preferably at a university) and be able to demonstrate a high level of energy and interpersonal communication skills. Please submit application and vitae by September 15, 1983 to:

Professor Daniel W. DeHayes
Dean and Director
Academic Computing
Indiana University
Bryan Hall 007
Bloomington, IN 47405
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DATA PROCESSING INSTRUCTOR

The successful applicant should have a bachelor's degree and three years teaching, industrial, or business experience. Must be technically competent in RPG II, COBOL, and BASIC programming languages. Salary based on experience and education. Projected employment date is September 1, 1983. Applications will be accepted until position is filled. Mail resume to: Personnel Office, Sumter Area Technical College, 506 N. Guignard Drive, Sumter, SC 29150. AA/EDE.

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Ground-floor opportunity to contribute to development of Computer-Aided Manufacturing systems. Develop and implement Computer-Aided Process Planning system, apply group technology principles, design computer software for manufacturing engineering applications, and employ knowledge of industrial and manufacturing engineering to isolate and attack productivity improvement opportunities.

Requires BS in Industrial Engineering or closely related field. Experience or advanced education in these areas is preferred.

Send resume in confidence to:

Employment Manager • Garrett Turbine Engine Company
P.O. Box 5217 • Dept. JC1-8/22
Phoenix, Arizona 85010



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**FEDERAL BUREAU
OF
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SOFTWARE SPECIALISTS**

The Federal Bureau of Investigation has immediate and near-future need for several Systems Programmers.

Applicants should have a minimum of one year IBM OS/VS2 (MVS) and Assembler Language experience plus experience with one or more of the following commercial software products:

ACF/NCP, ACF/VTAM, ADABAS, BESTI, CICS, CMF/DSO/TSA/PPE, COM-LETE, DISOSS, INTERCOMM, MSNF, NCCF, NPDA, ROSCOE, STAIRS, TSO, X.25 NPSI

Systems Programming experience is preferred but applicants possessing application programming experience will be considered.

Projects include: SNA implementation, Multi-Mainframe Networking, CICS implementation, Capacity Management Program development (including performance monitoring/evaluation) and development of Distributed Systems software support facilities.

All positions are located in Washington, D.C., and are career employment positions ranging in grade from GS-7 to GS-13 (\$16,559 - \$34,930 per annum). Applicants must be U.S. citizens and must pass a comprehensive background investigation.

Submit resume or SF-171 to:

SA E. J. O'Leary

Federal Bureau of Investigation

J. Edgar Hoover Building, Room 1997
Tenth and Pennsylvania Avenue N.W.
Washington, D.C. 20535

The FBI is an equal opportunity employer.

MATTEL TOYS

Expansion Opportunities for Data Processing Professionals

MATTEL TOYS is GROWING...EXPANDING...HIRING! We shipped more toy products in July than any month in our history, and toy orders for this year are at an all-time high.

To meet these growing needs, MATTEL TOYS must expand its Data Processing functions immediately. We seek the following professionals to join our MIS team.

MID-LEVEL DP MANAGERS

Our MIS management team now reports directly to senior level management, which gives the Data Processing group an integral role in the decision making and business planning processes. Experienced DATA PROCESSING MANAGERS are needed to coordinate Toy Division activities.

SUPERVISOR OF DATA BASE ADMINISTRATION

MATTEL TOYS has a newly started IMS Data Base. A working supervisor is needed to establish the necessary standards and procedures, as well as to design/implement data structures required to support the data needs of the Business Systems. Position calls for 5-7 years IMS/DLI Data Base Design and Implementation experience with a knowledge of related Internals.

SENIOR SYSTEMS ANALYSTS SENIOR PROGRAMMER ANALYSTS

MATTEL TOYS has a new, expanding Worldwide Marketing function in Data Processing. This new function requires both Systems and Applications Professionals to support the growing demands of this expanding group. IBM mainframe (COBOL, OS/MVS) experience will provide the basis for your qualifications. Your tools will include IMS, CICS, DMS, ADABAS, TSO, SP, DYL280.

Our salaries and benefits are highly competitive in an atmosphere charged with CREATIVITY, PRODUCTIVITY and GROWTH. Please rush your resume indicating job preference to: MONA STREHLER, MS 01-131-C09

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DATA PROCESSING

MVS, IDMS MANAGERS SOFTWARE PROFESSIONALS start up...

Sperry in Minneapolis/St. Paul

Sperry...ahead of competing mainframe technologies has experienced an acceleration in product development activities and market schedules. Now, join your professionalism with new high-tech opportunities where the work is challenging, the environment supportive, and the rewards many.

Immediate openings are available at our Roseville facility for experienced MVS and IDMS Managers and Software Professionals. Positions are in a large scale multi-processor PCM environment using MVS, JES3, IDMS and associated software. This effort is in support of an advanced computer design application to augment Sperry technology. This application is supported by a very large integrated on line data base utilizing IDMS.

System Software

MVS MANAGER

Manage System Programming group responsible for supporting a MVS/JES3 facility for a large scale multiple processor PCM environment.

SYSTEM PROGRAMMER - MVS

Specialized knowledge of MVS intervals with experience in system generation, installation, problem diagnosis/failure analysis and overall operating system maintenance.

SYSTEM PROGRAMMER - JES3

Specialized knowledge of JES3 with experience in the design, installation and maintenance of the system.

SYSTEM PROGRAMMER - VSAM

Specialized knowledge of VSAM with experience in an MVS/IDMS environment.

On Line Data Base

DATA BASE MANAGER

Manage a professional staff responsible for a highly integrated very large scale on-line data base. Experience with IDMS in a multiple processor MVS environment is highly desirable.

PROFESSIONAL CONSULTANT/ DATA BASE ADMINISTRATOR

Specialized knowledge of IDMS with experience in support of a large integrated on-line data base. Experience in multiple schema evaluation and optimization, data definition, data dictionary and optimal utilization.

IDMS DATA BASE ANALYST/PROGRAMMER

Specialized knowledge of IDMS internals and physical data bases on PCM DASDs. Familiarity with data base administration, logical data base planning and design, VSAM and MVS desired.

IDMS DATA BASE APPLICATIONS ANALYST

Data Management Systems externals including DDL, DML, Query Language Processor and Pascal.

We provide a very competitive salary and excellent benefits package. For immediate and confidential consideration, please direct your resume to: Professional Staffing (MVS, IDMS), Sperry Corporation, Computer Systems, P.O. Box 43942, MS4973, St. Paul, MN 55164. An Equal Opportunity Employer.



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We employ over 4500 people and offer excellent salaries, benefits and a relocation package. Compugraphic is located off Route 128—America's High Technology Highway. We're just 20 minutes from all the educational and cultural resources of Boston, and close enough to enjoy the many recreational opportunities of New England's beautiful mountains and beaches.

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We are seeking software and diagnostic engineering professionals at all levels, from individual contributors to project leaders and section managers. You will be given the resources you need to utilize the above technologies to develop a diversity of applications in these areas:

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Please forward resume to: Joe Hart at 200 Ballardvale St., Wilmington, MA 01887.

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DATA BASE ADMINISTRATOR IMAGE/3000

Burr-Brown Corporation is seeking applicants for a newly created position of Data Base Administrator in the Decision Support Systems Group. The selected applicant will have responsibility for designing and implementing data bases in support of a variety of applications running on Domestic and International located HP3000 Computer Systems.

Required qualifications include a BS degree in Computer Sciences, MIS, or equivalent experience; 2-3 years programming experience in manufacturing or accounting applications; 2-3 years Data Base Administration experience on HP3000 using IMAGE; and strong interpersonal and communication skills.

Our benefits are recognized as being among the most attractive in the industry, including profit sharing, stock bonus plans and excellent growth potential. Burr-Brown, located in Tucson, Arizona, mixes the excitement and charm of southwestern living with the technology of tomorrow.

If you are interested in a challenging Data Base career with a dynamically growing company, please send resume including salary history in confidence to:

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6730 S. Tucson Blvd.
Tucson, AZ 85706
(602) 746-7491**

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SYSTEMS PROGRAMMER PORTLAND, OREGON

The City of Portland, Oregon seeks Systems Programmer with IBM computer experience running MVS, JES-2, VTAM, CICS and DBMS. Candidate will be key individual in installation of major new system. Salary to \$35,464 with excellent benefits and working conditions. To receive official application contact Portland Civil Service, 1220 Southwest 5th Avenue, 1st Floor, Portland, OR 97204, (503) 248-4352. Completed applications must be received by 5 o'clock P.M., Friday, September 2nd, 1983. EOE

Field Support IBM OS/DOS

Internationally recognized software development firm. Assume responsibility for planning, implementation, post installation support & technical user training. Exp should include 3+ yrs. DP with an expertise in IBM hardware, strong fin systems & working knowledge of plug installation. Data base exp a+ Highly visible position with co. & their Fortune 500 clients. Benefits & bonus package \$35,000 FEE PAID

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Systems and hardware design for minicomputers and design and development of microprogram systems for high speed computers. 5+ yrs, MS Degree, major in elect engineering. 3 yrs exp or 3 yrs rtd exp in elect engin. Must have in-depth knowl of using bit-slice microprocessing. Resumes to Box CW 1995, 810 7th Ave, NYC 10019.

A CAPITAL CHOICE.

As a major insurance holding company, Capital Holding Corporation is growing and offers challenging career opportunities. We're looking for talented, top-notch professionals to join us in developing and implementing a variety of advanced systems. Our environment includes IBM 3081, 3033 operating under MVS/SP, CICS, DL/1 and TSO/SPF.

Lead Systems Programmer

You will be responsible for the following functions: DASD management, performance and tuning, MVS problem determination. 5 years OS/VS experience required.

Lead On-Line Programmer

Responsible for the maintenance and performance of CICS/VS systems, related software products, on-line systems exits and usability enhancements/utilities. 5-7 years of data processing experience in OS/VS including 3-5 years in CICS/VS and DL/1.

Early career recognition and intensive professional development are yours when you make the Capital Career Choice. Capital offers excellent compensation and benefit programs. For immediate consideration, please indicate which position you are applying for and send resume with salary requirements to:

Capital Holding Corporation

P.O. Box 32830, Dept. CW8
Louisville, KY 40232

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COMPUTER PROGRAMMERS FOR PROJECT ATHENA

Massachusetts Institute of Technology has just launched Project Athena, a \$70 million educational effort based on some 3,000 new DEC and IBM computers and on the key notion of coherence which makes possible the interchange of data and programs among different programming environments and machines. Several positions are now available for Computer Programmers to assist in the development of educational software which achieves the dual purpose of curriculum enrichment and technical coherence. Individuals will work closely with MIT faculty members and students and with the DEC/IBM staff members assigned to Project Athena.

Candidates with three to five years of professional experience in UNIX, graphics, local area networks, LISP, Fortran, and C are urged to apply. MIT offers competitive salaries and excellent benefits.

Please send 2 copies of resume, referencing PA-100 to:

Ms. Sally Hansen
MIT Personnel Office
E19-239
77 Massachusetts Avenue
Cambridge, MA 02139

MIT is an equal opportunity/affirmative action employer.

MIT

MARKETING MANAGER FEDERAL GOVERNMENT SALES

INSLAW, INC., a leading vendor of application software packages to the public sector, is seeking a federal government Marketing Manager to join its rapidly expanding marketing and sales force. This manager will market inslaw's packages for installation on in-house computers and will market the packages via inslaw's timesharing service.

Candidates must have a minimum of 5 years of experience in computer products/services sales to federal, civilian, and defense agencies. Interested principals should direct resumes to Ms. Davis. We offer an outstanding benefits package and an attractive salary plus commission plan.

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Data Processing Career Opportunities

Senior Telecommunications Specialist

Education: Bachelor's Degree — Technical discipline preferred. Specialized Teleprocessing Training.

Experience: Seven (7) yrs. with large scale T.P. oriented computer systems including two (2) yrs. experience designing complex T.P. networks.

Responsibilities: Evaluate T.P. alternatives. Provide Company management with comprehensive T.P. guidance and direction. Plan for and design an effective T.P. network; technically support its acquisition, installation, operation and disaster recovery planning, and evaluate its effectiveness once installed.

Senior Technical Analyst

Education: Bachelor's Degree in a Technical discipline — Computer Science preferred.

Experience: Seven (7) years with medium to large scale computer systems including three (3) years actually evaluating alternatives, planning for and formally recommending computer systems.

Responsibilities: Provide Company management with high level computer system capacity planning, configuration design, hardware software recommendations, and technical support for computer acquisition, usage accounting, insurance coverage and disaster recovery planning.

Working Environment

Both of these positions are part of a small technical support group which will afford maximum exposure to the individual selected. Company has multiple CPUs running both OS and VM sys.ems with a 300 terminal network (3270 type). For consideration, please submit last three years salary history and resume to:

Employment Office (1-16)

UI United Illuminating

P.O. Box 1564
New Haven, Conn. 06506
Attention: Dept. T.S.

An equal opportunity employer — women, minorities, handicapped and veterans urged to apply.

ASSISTANT VICE CHANCELLOR FOR INFORMATION RESOURCES

The Assistant Vice Chancellor, reporting to the Vice Chancellor for Administration, will lead the planning and development of information systems and resources including administrative computing, office automation, instruction and research computing, and telecommunications for the campus and will manage various information resources, including the \$1.7 million, 35-person advanced administrative computing center (HP3000) and academic computing center (IBM 4341). The Assistant Vice Chancellor will also function as project manager, under the direction of a project executive committee, in the strategic planning of a campus-and medical system-wide integrated academic information management system.

The Assistant Vice Chancellor has a leadership responsibility to catalyze and support the identification of information needs and enhancement opportunities throughout the campus and to provide policy guidance and technical advice to the various units and users in the development, application, and distribution of information and its supporting computing and telecommunications systems and technologies. The AVC also will represent the campus in information activities of the university and to vendors and various State reviews and planning agencies.

UMAB is seeking a forward-looking information systems manager with strong technical, conceptual, and interpersonal skills. Strongest applicants will have a graduate degree in Information Science, Computer Science, Information Technology or a related field and at least five years of progressive information management experience, including some academic or health science experience. Candidates are expected to have strong orientations to distributed computing and office automation blending micros and central computing and to integrated information via networks and relational data bases. Candidates should also demonstrate strong management and group process skills and the ability to achieve results in a complex, professionally oriented organization. An excellent compensation package is available.

UMAB is located at the edge of Baltimore's Inner Harbor Renaissance area. It includes Schools of Medicine, Nursing, Dentistry, Pharmacy, Social Work and Community Planning, and Law, with nearly 5,000 students, a large hospital and medical center complex, and a state wide emergency medical services system. It is also one of the leading federally supported medical research institutions with extensive research facilities.

Submit letter of nomination and/or application with resume and salary history by September 19th, 1983, to:

**University of Maryland at Baltimore
Vice Chancellor for Administration
520 West Lombard Street
Baltimore, Maryland 21201**
An equal opportunity/affirmative action employer

Lockheed-Georgia Company DATA PROCESSING SPECIALISTS



The Lockheed-Georgia Company, world-renowned leader in aircraft technology, offers challenging careers in the following areas:

IBM COMMUNICATION SPECIALIST

Position requires a minimum of three (3) years experience in installing and maintaining ACF/VTAM and ACF/NCP with bi-sync and SDLC devices. Must be proficient in Assembler language coding, network planning and debugging.

HARDWARE: IBM 3081, 3033, 3705, 3274

SOFTWARE: MVS/SP, ACF/NCP, ACF/VTAM, MSNF

COMMUNICATION SOFTWARE SPECIALIST

Minimum of one (1) year experience with Network System Corporation HYPERchannel/HYPERbus hardware or software. Experience with NETEX software and operating system software for IBM, CDC, Univac, or DEC computers highly desirable.

COMMUNICATION PLANNING SPECIALIST

Position requires a minimum of four (4) years experience in telecommunications network planning and management. Should be capable of planning, selecting, implementing, and supporting advanced telecommunications networks for transmission of mixed information types including voice, image, and data.

MINI-COMPUTER SPECIALIST

Specialists needed with two (2) or more years experience in system software support for Tandem T-16 or DEC VAX computers. Capabilities should include use of Assembler languages, SYSGEN, local code changes, troubleshooting, BASIC, COBOL, FORTRAN & communications methodology.

IBM SYSTEM SOFTWARE SPECIALIST

Position requires a minimum of three (3) years experience in support of large mainframe IBM or compatible computers using latest IBM software. Must be able to perform SYSGEN's, apply maintenance using SMP4, troubleshoot system problems and performance tune and measure in a TSO environment. Assembly language proficiency mandatory.

HARDWARE: IBM 3081 K 32, IBM 3380, STC8350, 3800, 1403, 3705

SOFTWARE: MVS-SPL, ACF VTAM, NCP, TSO/SPF, CICS, VS/COBOL, VS/FORTRAN, RACF

IBM IMS/VS DATA BASE SPECIALIST

Position requires a minimum of two (2) years experience in technical support of IBM DL/1 in IMS/VS environment. Must be able to design data bases, define control environment, apply maintenance, and troubleshoot system problems. Proficiency in BAL required.

HARDWARE: IBM 3081 and 3033; 3380 and 3350 direct access.

SOFTWARE: MVS/SP, IMS/VS, DL/1, ADF, VS/COBOL.

IMS/VS SYSTEMS PROGRAMMER

Position requires a minimum of two (2) years as an IMS applications programmer using COBOL, plus two (2) years experience as an IMS/VS system programmer with proficiency in the following areas: Installation, SYSGEN, Maintenance, Problem Determination, Debugging, Performance Measurement and Tuning, OS JCL, SMP4.

SPERRY (UNIVAC) SOFTWARE SPECIALIST

Position requires a minimum of two (2) years experience in support of Sperry 1100/8X systems. Must be able to perform SYSGEN's, apply maintenance and troubleshoot system problems. Proficiency in MASM and COMUS required. Experience in Secure, Sentry, Quota, and TSS desired.

HARDWARE: Sperry 1100/83, 8450, 8470, DCP/40

SOFTWARE: OS/1100, R38, CMS 1100, DMS 1100-8R3, IRU, COBOL, PLUS

SPERRY (UNIVAC) DATA BASE SPECIALIST

Position requires a minimum of two (2) years experience in technical support of DMS 1100 software. Must be able to perform DMS 1100 SYSGEN's, apply maintenance and local code, and troubleshoot. Proficiency in Sperry 1100 Assembly language required.

HARDWARE: Sperry 1100/83, 8450, 8470

SOFTWARE: OS/1100, R38, DMS 1100-8R3, IRU

The Lockheed-Georgia Company offers excellent salaries, comprehensive benefit program including Company-paid relocation to the Atlanta area. For immediate confidential consideration, please forward resume to:

LOCKHEED-GEORGIA COMPANY
Professional Employment
Dept. 90-31, Zone 408
Marietta, GA 30063

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Lockheed-Georgia Company

Systems Analyst
State agency with responsibility to administer comprehensive state financial aid program is seeking a person to assist in the current implementation of a student based Financial Aid Information System using SAM II software marketed by Sigma Systems Inc. The system is being installed on a DEC VAX-11/750. Person selected will be responsible for the VAX/VMS operating system and making modifications to applications software. Qualifications include college training or equivalent preferably in Computer Science or Business Administration with 3 to 5 years experience in programming and analysis. Candidates must be experienced in COBOL and should know the VAX/VMS operating system. Experience with TSO, FORTRAN and research packages such as SPSS is desirable. Experience in communications skills, orally and in writing, is essential.
Salary: \$21,500 - \$30,000 plus excellent benefits
Submit application letter with current resume to:
**Personnel Services
Minnesota Higher Education
Coordinating Board
400 Capital Square Building
540 Cedar Street
St. Paul, Minn. 55101
An Affirmative Action/
Equal Opportunity Employer**

TECHNICAL SUPPORT MANAGER MONTGOMERY COLLEGE

Montgomery College, a comprehensive community college in suburban Maryland, is seeking applicants for the position of Technical Support Manager. Applicants must have 8-10 years experience in all phases of systems software, of which 2-4 must be in major project leadership. Demonstrated technical expertise is required in at least one major software function — operating systems (DOS/VSE), teleprocessing/telecommunications software (DTAM, VTAM, and NCP), and data base management systems (DL/1, IDMS). A high degree of technical knowledge in the other areas noted is also required. Person must be able to identify the impact of system software in the Computing Services Department. Experience in project planning and management skills are also needed. The current environment is IBM with dual 4341's with 3375 disk drives being installed and using 3705 for telecommunications to 2 remote campuses and Wang Office Automation networking. Major software consists of VM, DOS/VSE, CICS, DL/1 and MUSIC. The salary range for this position is from \$31,470 to \$44,075. The starting salary will be based on the candidate's qualifications and is expected to be in mid-range. Benefits are excellent. Send resume with above position title noted to Personnel Office, Montgomery College, 51 Manassas Street, Rockville, MD 20850. Women and minority candidates are encouraged to apply. An EEO/AA/Title IX Employer.

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DATA PROCESSING PROFESSIONALS UNIVAC 1100

TNT Pilot is a growing subsidiary of Thomas Nationwide Transport, an international billion-dollar transportation company. The MIS Department is a progressive group dedicated to the development and support of state-of-the-art EDP applications. The continuing growth of this department has created the following openings in our Winston-Salem, North Carolina corporate headquarters.

MANAGER-SYSTEMS & PROGRAMMING

Position requires a minimum of 5 years experience in systems and programming, 3 or more years experience in project management and a 4 year college degree in Computer Science or related field. UNIVAC 1100 experience and exposure to the transportation industry are preferred.

PROGRAMMER ANALYST

Position requires a minimum of 3 years experience in programming on UNIVAC 1100, COBOL, DMS-1100. A 4-year degree in Computer Science or related field and familiarity with QLP and DPS are preferred.

SYSTEMS SUPPORT COORDINATOR

Position requires minimum of 3 years experience in systems installation and support; OS-1100, CMS-1100, DMS-1100, TIP. A 4-year degree in Computer Science or related field and exposure to QLP, DPS, and MAPPER environment are desired.

You will like living in Winston-Salem, a diverse city offering prosperity and quality of life. Culture, recreation, climate and excellent schools are among the many advantages that have won Winston-Salem national recognition.

These outstanding career opportunities offer competitive salaries and a comprehensive benefits package. Qualified individuals please submit resume, including salary history and requirements, to:

TNT PILOT

Employment Manager
P.O. Box 27153, Winston-Salem, N.C. 27153-0000
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FIELD ENGINEERS

Dataserv Computer Maintenance is expanding nationwide. We now have immediate openings in major cities and will be adding more in the near future.

These are key positions and provide excellent opportunities that will lead to further promotion in a fast growing company. Excellent compensation plan and good fringe benefits for experienced individuals. Your potential for personal advancement with a \$100 million plus company is the greatest right now as we expand.

We now have immediate openings in these cities for these positions:

Washington D.C. — FIELD ENGINEERS

We need experienced F/E to maintain IBM 327X display equipment.

Milwaukee, Wisconsin — FIELD ENGINEERS

Immediate opening for engineer with experience on IBM tapes, printers, disks, display equipment.

Dallas, Texas — FIELD ENGINEERS

Excellent position for experienced Field Engineer to work on IBM 327X equipment. We have several openings in the Dallas, Ft. Worth metro area.

Los Angeles, California — FIELD ENGINEERS
Field Engineers required for the support of IBM 3600 Banking and/or Supermarket Systems.

Series 1 — FIELD ENGINEERS

Immediate openings — Minneapolis/St. Paul. Other cities nationwide in the very near future.

Dataserv will soon have additional opportunities for field engineers and technical specialists in several other major cities throughout the United States. If you are considering a change in employment, contact Dataserv for a review of what we have to offer.

For immediate consideration and more information call Toll Free — 800-328-6729 or send your resume to: Bev Walters, Dataserv Computer Maintenance, Inc., P.O. Box 3003, Hopkins, MN 55343. We are an equal opportunity employer and all inquiries are considered confidential.

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Part or full time, flexible hours, work at home if desired, exciting and challenging opportunities with a small but growing company specializing in data base retrieval techniques and text manipulation. Requires familiarity with micro-processors and experience in systems programming or micros. \$35,000-\$50,000 salary full time, or \$20-\$35 per hour part time depending on qualifications and experience. Send letter and resume to Carlyle Systems, 600 Bancroft Way, Berkeley, CA 94710

Senior Programmer Analyst

Multi-divisional Los Angeles firm seeks person with 4-5 years retail applications experience.

Requires IBM mainframe equipment experience utilizing COBOL, CICS, RPG II, DMS, ICCF, VTAME, and DOS/VSE-JCL. Top pay plus profit sharing.
Please forward resume including salary history:

Reply to CW-B4243
Computerworld
Box 880
Framingham, MA 01701

SR. SYSTEMS ANALYST Design & impl. computer systems rtd to financial insts. Consults w/mgmt & prog. personnel to clarify any nec. corrections. Also review progs to increase efficiency & conserve storage space. B.Sc. or equiv. in Computer Sci., Math, Physics or Data Processing. Must have knowl. of COBOL, CICS & IDMS. 2 yrs or 2 yrs programming. \$44,000 pa. to work 40 hrs/5 days/wk. Software Design Associates, Inc., 1620 Route 22, Union, NJ 07083. PLS SEND RESUMES.

DALLAS OPPORTUNITIES

Peer Services, Inc., supplies major national financial institutions with innovative data processing services, the combined capabilities of skilled banking professionals and advanced computer technologies. The following opportunities are now available:

MANAGER OF DEPOSITS

Our current staffing requirements include a Manager of Deposits in our Applications Development Division. Your experience should include a minimum of 8 years in data processing with at least 3 of those years managing a large scale banking project. Deposit applications experience is a must, preferably with Marshall and Ilsley (M&I) package.

SENIOR SYSTEMS ANALYSTS

We are currently seeking several Senior Systems Analysts to work in our Customer Services and Applications Development Divisions. Experience should include a minimum of 6 years COBOL and OS/JCL as well as MSA general ledger or deposit applications experience, preferably with Marshall and Ilsley (M&I) package. Additional banking experience would be a plus.

We pay top level salaries and have a comprehensive benefits package including dental insurance. Respond with your resume and salary history. All replies will be held in strictest confidence.



PEER SERVICES INC.
Bob Walsh or Mike Handlin
13465 Midway Road
Dallas, Texas 75234

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It takes creativity to meet the future needs of the financial industry. That's why Gibraltar Savings is looking for highly-motivated professionals to join our rapidly expanding corporation.

MANAGER Retail Banking Systems

Your responsibilities will include gathering and analyzing information for developing and modifying the data processing systems used by the retail banking branches and branch support departments. Provide direction for a staff of analysts in researching and defining problems, developing system specs for users, testing and conversion plans.

Experience must include proven analytical systems work from a user standpoint and supervisory and project management skills.

BUSINESS SYSTEMS ANALYST Checking Systems

Responsible for user specifications and testing of a new checking account package. Interfaces to Item Processing and Saving Systems. Qualified candidate will have DDA application experience and demonstrated project abilities.

Gibraltar offers growth, challenge and an excellent compensation package. For confidential consideration, please forward your resume, with salary requirements, to:



T.M.

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A MIDDLE EAST OPPORTUNITY IBM S/38 RPG III

ZAHD TRACTOR is installing four System/38 computer systems to maintain its position as one of Saudi Arabia's largest and most successful distributors of vehicles, earthmoving, and other heavy equipment. We have need for several...

ANALYSTS AND PROGRAMMERS

... to operate in the very best of working and social environments in Jeddah on the Red Sea. We offer challenging and long term career prospects, attractive salaries, and generous benefits, medical care and leave. In addition, major tax exemptions apply.

An excellent knowledge of all aspects of S/38 techniques (RPG III and C/L) and a background in data processing are essential. Your experience should include billing, inventory control, purchasing, accounts receivable and/or general ledger.

Candidates should submit complete resume, including salary history, to:

ZAHD TRACTOR
Reply to CW-B4246
Computerworld
Box 880
Framingham, MA 01701

COME HELP US GROW! OPERATIONAL SYSTEMS ANALYSTS

Our Corporate commitment to sophisticated computer systems technology has allowed our growth to the next level of State of the Art: systems development by separating the operational and systems aspects of a Corporate project.

Our operational analysts will function within the users' organization, assisting in the development of systems projects. By identifying and evaluating cost effective improvements, the analysts' impact will be significant.

Successful candidates may vary in professional background: financial, distribution, industrial engineering, manufacturing, MIS systems analysis, or retail business procedures. Each must have demonstrated ability in situational analysis and problem definition. Clarity of thought and expression with effective interpersonal skills are mandatory. A general awareness of computer systems technical design and systems specifications is necessary.

We offer a competitive salary and outstanding Benefits Package which includes Major Medical, Hospitalization, Life, Dental & Optical Insurance, Retirement Plan, Profit Sharing, and much more.



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Equal Opportunity Employer M/F/H

Programmer Programmer Analyst Systems Analyst

Experience with COBOL industrial applications on large scale computer. Requires exposure to one or more of the following areas:

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 - Financial,
 - Employee relations applications,
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General Electric Company
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St. Petersburg, FL 33733
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SYSTEMS OFFICER

Expanding W. NY firm's instit. has devel. a requirement for sr. ml. sys. pro. Explosive growth has created need to increase mgmt. strength at several lvls. Proven track record in tech disciplines, pref. IBM OS/MVS, & suprv. of lge. staff, req. Excellent personal image & communication skills a must. \$45,000.

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LAD

Engineering and computer specialists interested in advanced military tactical support programs will find Lockheed's division in Austin, Texas, to be extremely interesting.

Lockheed has formed the division to concentrate on some major tactical support programs. They include command and control and target location systems and are active programs for the Army, Navy and Air Force. For those seeking challenge, immediate openings exist for:

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Several positions exist for engineers at various levels to design avionics test programming sets. A BSEE or equivalent plus 4 years of related experience are required. Some digital design concepts and communication theory with micro-processing-based test equipment background are desirable. Experience with EQUATE/ATLAS is a definite plus.

★ ADVANCED SYSTEMS ENGINEERS

Requires a BS in Engineering or Science. Prefer applicants with MS/PhD and 3 years experience in Research and Development of high technology C³, Electronic Warfare, Counter Measures or Intelligence Systems.

★ REAL-TIME SYSTEMS PROGRAMMERS

Requires a BS and 4 years experience in Assembly language. Prefer applicants with Rolm 1666/Data General NOVA computers and military systems.

★ SOFTWARE SPECIALISTS

Capable of design and development of applications, systems and data communications S/W. Prefer candidate with experience in Ada, graphics display, C³I applications and MIL-SPEC standards.

★ SYSTEMS ANALYSTS

Hardware/software generalists with broad systems background in mini/micro computers, real time processing, tactical intelligence and C³ applications. Knowledge of military specifications and controls is a plus.

★ HARDWARE ENGINEERS

Engineers who can assimilate computer hardware systems. Requires individuals knowledgeable of current technology and military computing hardware, graphics display devices and data communication.

★ RF/MICROWAVE ENGINEERS

Background in RF, antennas, microwave power supply design, and computer-aided analyses to assume responsibility for EMC/EMI TEMPEST activity on major program. Requires BS and 4 years experience in design and EMC/EMI testing.

Lockheed offers unmatched opportunity with plenty of room to grow. And in Austin's pleasant setting, affordable living makes excellent salaries go even further.

Lockheed-Austin's exceptional wage and benefits package includes medical, dental and life insurance. A retirement plan is provided, along with much more.

Qualified candidates should send resumes to: Professional Employment, Dept. 653-0883, P.O. Box 17100, Austin, TX 78760. Lockheed is an equal opportunity. Affirmative Action employer. U.S. citizenship is required.

Lockheed-Austin

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COMPUTER LEASING MARKETING MANAGER

ECONOCOM, a 10-year-old, well-respected computer leasing organization, has an outstanding opportunity for a people-oriented manager who has an in-depth knowledge of the IBM computer leasing/resale market. Must have proven management skills, possess ability to negotiate contract terms and be able to motivate the 6-7 marketing reps reporting to this position. Attractive compensation package with realistic ability to earn in excess of \$150,000 annually.

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We are also looking for a limited number of qualified marketing reps who know the IBM product line, understand tax-leveraged leasing and are capable of making high-level executive sales presentations. Realistic earnings of \$100,000 plus.

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SYSTEMS ANALYST Communications

Mobil Exploration and Producing Services, Inc., providing advanced geophysical and geological data support to Mobil Oil Corporation's exploration activities worldwide, has an excellent career opportunity for a Computer Systems Analyst. Working in our state-of-the-art Computer Center in Dallas, this professional will be involved in telecommunications subsystems.

To qualify you must possess the following:

- Minimum 3-5 years experience with operating systems, high level languages, and assembly language programming
- Minimum 1 year experience in telecommunications related to software, protocols, terminals and communications equipment
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Responsibilities include:

- Provide communications software support for CDC operating systems.
- Evaluation of communications software packages
- Participate in network planning, implementation and training.

Mobil offers the salary and comprehensive benefits package that you would expect from an industry leader. Qualified candidates should send their resume to: L.A. Schroeder, Employee Relations, Mobil Exploration & Producing Services, Inc., P.O. Box 900, Dallas, Texas 75221.

Mobil

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DATA BASE ANALYST SYSTEMS PROGRAMMER

We are a progressive electric utility seeking self-motivated individuals to fill the above positions. The ideal candidate for the Data Base Analyst position should have a degree preferably in Computer Science and three years related experience. Candidates for the Systems Programmer position must have a degree in Computer Science or Math and have a minimum of one year experience working with operating system software.

Current environment is an IBM 3083-E and a 370/158 operating with VM/SP, OS/VS1 IMS DB/DC. Migrating to MVS. Successful applicant will find a relaxed way of life, excellent working conditions, year-round outdoor recreation, a safe place to raise a family, and exposure to the delightful atmosphere and cultural pleasures of historic Charleston.

Send resume and salary requirements in confidence to:

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Moncks Corner, S.C. 29461
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Cherry Hill, New Jersey 08002
(609) 667-4488

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Employment Agents for Computer Professionals

PROGRAMMER/ANALYST

For employer who exports high technology computers to Taiwan. Will analyze business problems defined by foreign buyers (problems are usually described in Chinese language) and develop software packages with particular emphasis on business applications (input and output will be primarily in Chinese). Job involves working with PDP-11 and VAX equipment using COBOL and PASCAL languages. Requires a Master's Degree in Computer Science or Business Administration (if candidate holds an MBA there should be curriculum emphasis on Computer Science). Salary \$1800 per month, 40 hour week, 9 A.M.-5 p.m., M-F. Requires knowledge of Chinese language. Please contact Utah Job Service, 1254 S. Main St., Salt Lake City, Utah, 84147. Job order number 38637.

SR. PROGRAMMER-In charge team of programmers, respsbl. for implementation financial applications. Analysis & design of systems for conversion from manual procedures, as well as enhancement of existing comp. sys. to ensure efficient operation. B.Sc. or equiv. in Comp. Sci., Math., Data Processing or Physics. Must have knowl. of COBOL & CICS (Command Level). \$28,000 p.a. to work 35 hrs/5 days/wk. Atlantic Information Systems, Inc., 575 Madison Ave., NY, NY 10022 PLS SEND RESUMES.

INSTRUCTOR-COMPUTER PROGRAMMING- Teach fundamentals & advanced aspects of computer programming & languages, ie. COBOL, RPG & BASIC. Also instruct advanced students in systems analysis techniques. M.Sc. Computer Science. Knowledge of RPG, COBOL & BASIC. 6 mths exp or 4 mths as teaching assistant. \$19,000 p.a. to work 40 hrs/5 days/wk PLS SEND RESUMES. Albert Merrill School, 21 W 60th St., NY, NY 10023.

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City of Greeley, CO, highly responsible work in the design, implementation and maintenance of computer systems. Univac 9040 computer. Requires B.S. in Data Processing, knowledge of COBOL and RPG II, and three years progressively responsible experience. Excellent benefits provided. Send resume and salary requirements by September 6th to Personnel-PA, City of Greeley, 919 Seven Street, Greeley, CO 80631, (303) 353-8251, EOE

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MANAGER OF INFORMATION SYSTEMS

A Montgomery County, Maryland-based high technology manufacturing company seeks an aggressive, take charge DP professional to manage a major department of a rapidly expanding Management Information Systems group.

This position reports to the Director Manager Information Systems, will direct the day-to-day operations, and be responsible for:

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We are committed to a progressive program of information resource management as an essential element of our expansion plan.

Interested applicants should send resumes, including salary history and requirements, to CW-B4244, Computerworld, Box 880, Framingham, MA 01701.

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BS with 6-10 yrs. business applications analysis/auditing experience. Skilled in implementing Structural Systems Analysis and Design projects, including fluency in using tools such as Data Flow Diagrams and logical data analysis. Possess good written/oral communications skills for briefing management and peer groups, as well as user, in findings and progress at each state of system/sub-system/module development.

ANALYST/PROGRAMMERS

5 yrs. experience in developing and maintaining interactive systems using large-scale IBM/VM/SP, OS/MVS, CICS, ADABAS/DBMS, DP software in distributed EDP environment. Degree required.

OPERATIONS SUPPORT ANALYST

BS with 4-6 yrs. systems programming experience, coupled with 2+ yrs. operations experience in large-scale, complex information systems operation; working knowledge of DASD Space Management techniques; ability to work with minimum supervision in "team" environment.

We offer an excellent benefit package including: a medical, life, accidental death, disability and profit sharing plan. You will additionally receive 25 working days vacation, 15 holidays, free furnished housing, annual return home travel, paid relocation expenses, plus eligibility for present Federal Income Tax exclusions. U.S. CITIZENSHIP REQUIRED FOR ALL POSITIONS.

Please send resume, INDICATING POSITION TITLE FOR WHICH YOU ARE APPLYING, with present salary to Personnel, SYSOX-ISA, SYSOX INTERNATIONAL, INC. 10590 N. Tantau Ave., Cupertino, CA 95014. INDIVIDUALS ONLY APPLY.

SYSOX

Sysorex International Inc.



DP PROFESSIONALS

Chemical Abstracts Service has several openings for experienced data processing professionals. Located in Columbus, Ohio, a surprisingly dynamic and growing city, CAS is a world leader in data-based scientific information services. These openings are a result of continued growth in our computerized information processing activities.

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We need people with strong skills in the area of database design and administration to consult in the use of current DBMS's, manage installation of enhancements to those DBMS's, evaluate new technology in the database area, design and implement databases, and establish standards and procedures for data and database administration. We operate a large database environment using ADABAS and a system developed locally. In addition, we operate a large scale UNIX-based integrated office system using DEC VAX-11/780's and DEC PC-350's in a network environment with IBM 370 and 3081D systems running MVS.

This experience requires a Bachelor's degree or equivalent and experience in several of the following: the use and maintenance of database software such as ADABAS or other inverted key, hierarchical, or relational systems (such as IDMS, System 2000, Model 204, or IMS); database design and implementation; data or database administration using a data dictionary (such as MSP's Data Manager); and use of end-user query languages such as INTELLECT or NATURAL.

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We are seeking people to help design, develop, and support data communications networks for UNIX and IBM systems. This work will support an advanced office automation environment using personal computers and intelligent terminals at all workstations and using the Ethernet local area network technology.

This position requires a Bachelor's degree or equivalent and 3-5 years experience in one or more of the following: UNIX internals; network protocols such as XNS, IBM telecommunications (TCAM, SNA, BISYNC); Ethernet; PDP-11 and VAX architecture; IBM MVS or MVS/XA operating systems; and DEC RT11 operating system.

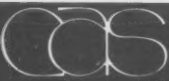
APPLICATIONS PROGRAMMER/ANALYSTS

We also need experienced programmer/analysts to aid in the design and development of applications systems in widely diverse areas such as online services, graphic input and display, business systems, chemical information processing systems, and micro- and mini-computer systems. These positions require a Bachelor's degree or equivalent and experience programming in C in a UNIX environment, or programming in Assembler or PL/I in an IBM/TSO environment.

If you are looking for challenging and rewarding job assignments, an ongoing career development program, a progressive benefits package, a professional working environment, and a salary commensurate with your background and experience, please write to:

CHEMICAL ABSTRACTS SERVICE

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Telephone 614-421-3699



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SYSTEMS PROFESSIONALS

Challenging opportunities available with a division of a fortune 500 Corporation. Environment includes a sophisticated, interactive state-of-the-art IBM 3033N12 providing computational resources to the business. Application or systems programming experiences in the two to four year range are required. We provide a working and living quality of life arena conducive to accomplishment and self actualization as our plans carry us into the late 80's. Salary commensurate with experience/education. Send resume with requirements to:

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SYSTEMS PROGRAMMER

The Westinghouse Corporate System Integration Department has an immediate need for experienced Systems Programmer.

The successful candidate will have the opportunity to participate in the implementation of the JES-3 operating system software, and provide technical assistance in support of Westinghouse Data Centers.

A minimum of 3 yrs. experience with large IBM mainframe operating systems to include Assembler, JES-3 and MVS; a Bachelor's degree in Computer Science, Math or other related technical discipline or equivalent experience is required.

The position is highly visible with opportunities for advancement within the Corporation. To further explore this exciting opportunity and the excellent salary and benefit package, send your resume and salary history in confidence, to:

Human Resources Department
Westinghouse
Productivity & Quality Center
P.O. Box 160
Pittsburgh, PA 15230

Westinghouse

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Focus Your Future On Tektronix

Software Engineering Manager

The Information Display Division has an excellent opportunity for an individual with a proven record of software product development from initial concept to production. You will hire your own team of software engineers and technically lead them in the development of graphic peripheral systems for the CAD industry. Your qualifications will include experience with:

- Commercially available CAD Systems
- Software project management
- Structured design methodology
- Computer graphics
- Real time multi-tasking operating systems
- Pascal
- 68000, 8086 Assembly

You will also need good communication skills to coordinate activities between groups.

Opportunities are also available in this same group for:

Imbedded Software Engineer

Responsibilities will include design and implementation of imbedded software for a new product line of graphic peripheral products. You will need demonstrated software engineering design and implementation skills, Pascal, 68000 assembly, effective documentation and communication skills and a BSCS/EE.

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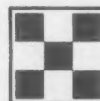
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Associate Director

University Computing and Learning Services

Overview and Description of Position:
Ohio University, a state-assisted institution with an enrollment of nearly 15,000 on the main campus and 7,000 on five regional campuses, invites applications for the position of Associate Director, University Computing and Learning Services (UCLS). This position, reporting to the Director of UCLS, is responsible for administrative data processing, systems management and computer operations. The managers for Systems Development, Systems Support, Technical Systems Support, and Production report to the occupant of this position. The position requires a generalist with a strong technical background which must be complemented by strong management skills and a sound development methodology.

Ohio University's network of computer systems includes an IBM 4341-8, IBM 370/158-8, IBM System 34, HP 1000, HP 3000/30, HP 3000/88, DEC VAX 750, DEC 11/44, INTERGRAPH 751 CAD/CAM and multiple micro computers, primarily IBM PCs and Apples. Examples of current operating systems are VMSP, OS/VS1, CMS, JCS, SQA/SSPP, MPE, VMS, and RSTC.

Qualifications:
Bachelor's degree required; master's degree preferred, with ten years of broad-based experience in computer systems, including seven years of progressive supervisory and managerial experience.

Salary and Benefits:
Position salary range is \$32-\$42,000. Excellent benefits including a dependent paid tuition program.

Closing Date for Application
September 18, 1983

To Apply

Send a letter of interest with resume, transcript reflecting the highest degree earned and the names of three professional references to: Larry Beall, Director, Ohio University Computing and Learning Services, Hening Hall, Athens, Ohio 45701
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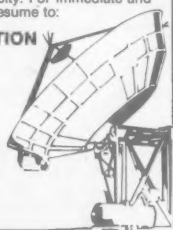
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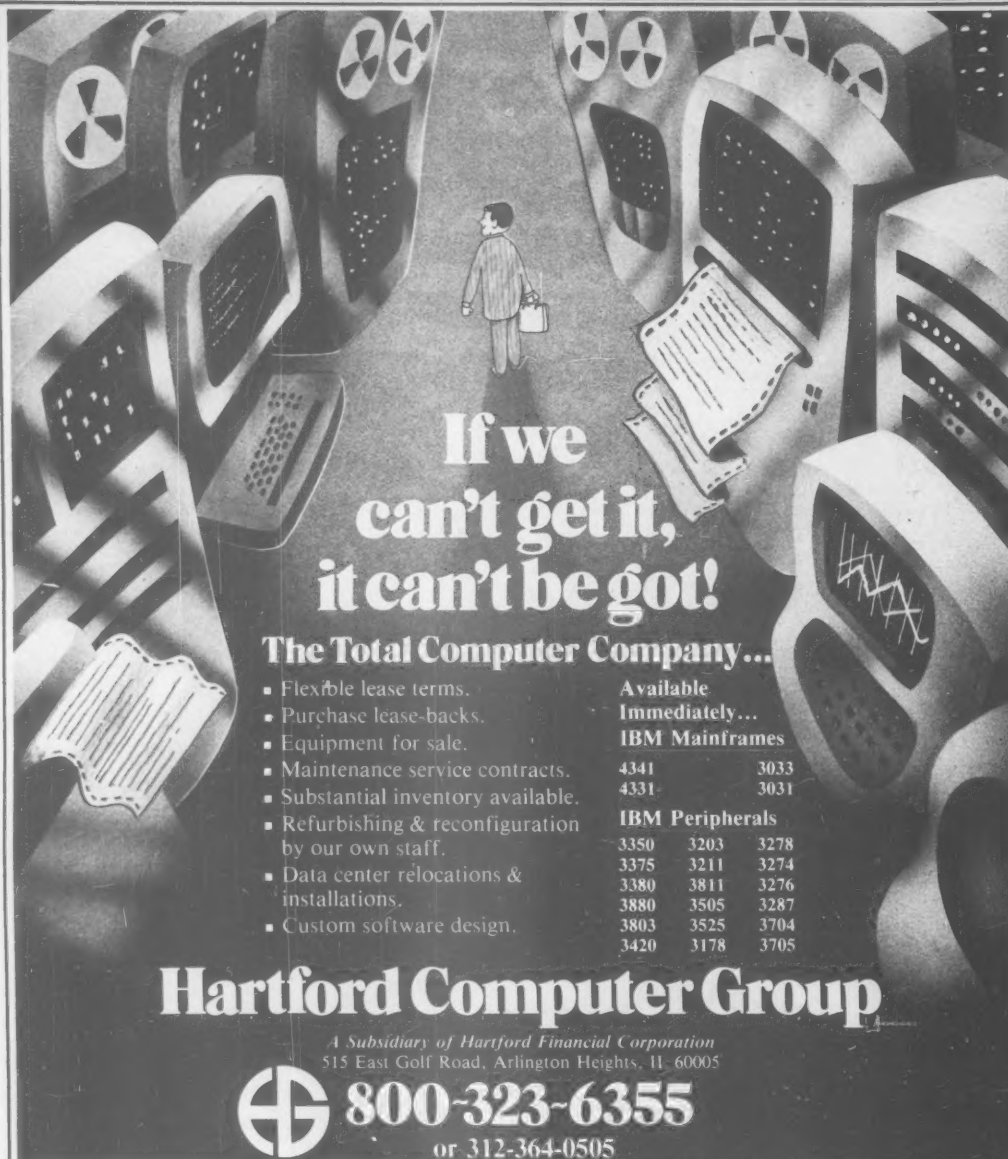
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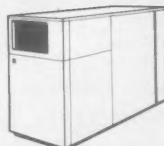
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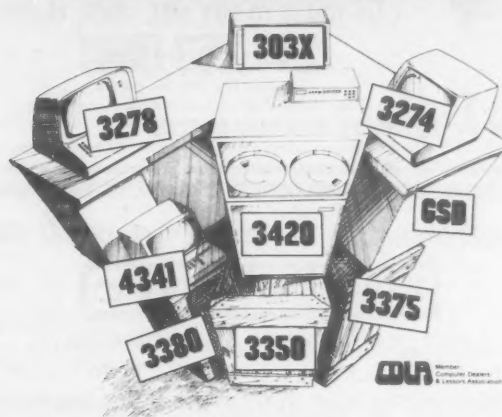
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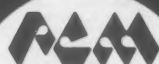
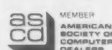
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